Date: 6 October 2000
To: Bechtel Hanford, Inc. (technical representative)
From: TechLaw, Inc.
Project: 100-H Areas - Full Protocol - Waste Site 100-H-17
Subject: Radiochemistry - Data Package No. H0924-TR (SDG No. H0924)

INTRODUCTION

This memo presents the results of data validation on Summary Data Package No. H0924-TR which was prepared by ThermoRetec (TR). A list of samples validated along with the analyses reported and the requested analytes is provided in the following table.

Sample ID	Sample Date	Media	Validation	Analysis
B0YR43	7/20/00	Soil	C	See note 1
B0YR44	7/20/00	Soil	C	See note 1
B0YR45	7/20/00	Soil	C	See note 1
B0YR46	7/20/00	Soil	C	See note 1
B0YR47	7/20/00	Soil	C	See note 1
B0YR48	7/20/00	Soil	C	See note 1
B0YR49	7/20/00	Soil	C	See note 1
B0YR50	7/20/00	Soil	C	See note 1
B0YR51	7/20/00	Soil	C	See note 1
B0YR53	7/20/00	Soil	C	See note 1

1 - Gamma spectroscopy; alpha spectroscopy (isotopic plutonium); total strontium.

Data validation was conducted in accordance with the BHI validation statement of work and the 100 Area Remedial Action Sampling and Analysis Plan (DOE/RL May 1998). Appendices 1 through 5 provide the following information as indicated below:

Appendix 1. Glossary of Data Reporting Qualifiers
Appendix 2. Summary of Data Qualification
Appendix 3. Qualified Data Summary and Annotated Laboratory Reports
Appendix 4. Laboratory Narrative and Chain-of-Custody Documentation
Appendix 5. Data Validation Supporting Documentation

DATA QUALITY OBJECTIVES

- **Holding Times**

  Holding times are calculated from Chain-of-Custody forms to determine the validity of the results. The maximum holding time for radiochemical analysis is 6 months.

  All holding times were acceptable.

- **Blanks**

  Laboratory Blanks

  Blank samples are analyzed to determine if positive results are due to laboratory reagent, sample container, or detector contamination. If blank analysis results indicate the presence of an analyte above the MDA, the following qualifiers are applied: All positive sample results less than five times the highest blank concentration are qualified as estimates and flagged "J"; sample results below the MDA are qualified as undetected and flagged "U"; sample results above the MDA and greater than five times the highest blank concentration are not qualified.

  All other blank results were acceptable.

  Equipment Blank

  One equipment blank (B0YR53) was submitted for analysis. Uranium-233, uranium-238(aspec), potassium-40, radium-226, radium-228, thorium-228 and thorium-232 were detected in the equipment blank. Under the BHI statement of work, no qualification is required.

- **Accuracy**

  Accuracy is evaluated by analyzing distilled water or field samples spiked with known amounts of radionuclides. The sample activity as determined by analysis is compared to the known activity to assess accuracy. The acceptable laboratory control sample and matrix spike recovery range is either 70-130% or ± 3 sigma. In addition, samples may be spiked with a radiochemical tracer to assist in isolating the radioisotope of interest with the yield of the tracer being used in calculating sample activity. The acceptable range for tracer recovery is 20% to 105%. Spike sample results outside the above ranges result in associated sample results being qualified as estimates, rejected, or not qualified, depending on the activity of the individual sample.

Due to a radiochemical yield of 108%, the detected isotopic uranium results in sample B0YR46 were qualified as estimates and flagged "J".

All other accuracy results were acceptable.

- **Precision**

Analytical precision is expressed by the RPD between the recoveries of duplicate matrix spike analyses performed on a sample. Precision may also be assessed using unspiked duplicate sample analyses. If both sample and replicate activities are greater than five times the CRDL and the RPD is less than 30 percent, the results are acceptable. If either activities are less then five times the CRDL, a control limit of less than or equal to two times the CRDL is used for soil samples and less than or equal to the CRDL for water samples. If either the original or replicate value is below the CRDL, the applicable control limits are less than or equal to the CRDL for water samples and less than or equal to two times the CRDL for soil samples. If the RPD is outside the applicable control limit, associated results are qualified as estimated detects or estimated non-detects.

All duplicate results were acceptable.

Field Duplicates

One set of field duplicates (B0YR46/B0YR51) were submitted for analysis. The results were compared using the same criteria as for a laboratory duplicate. All field duplicate results were acceptable.

- **Detection Levels**

Reported analytical detection levels for undetected analytes are compared against the 100 Area Remedial Action Sampling and Analysis Plan target detection limits (TDLs) or the contract specified MDA if no TDL was specified, to ensure that laboratory detection levels meet the required criteria. The following analytes were reported above their TDL: Uranium-238(gea) in all samples; uranium-235(aspec) in all samples; americium-241(gea) in all samples except B0YR45 and B0YR53; europium-155 in all samples except B0YR53; uranium-235(gea) in samples B0YR43, B0YR44, B0YR45, B0YR46, B0YR47, B0YR48, B0YR50 and B0YR51; europium-154 in samples B0YR44, B0YR45, B0YR46, B0YR47, B0YR48 and B0YR51; europium-152 in samples B0YR47 and B0YR48; cobalt-60 in samples B0YR45 and B0YR47; uranium-238(aspec) and uranium-233(aspec) in sample B0YR51; plutonium-238 and plutonium-239/240 in samples B0YR43 and B0YR51; cesium-137 in samples B0YR47 and B0YR51. Under the BHI statement of work, no qualifcation is required. All other reported

laboratory MDAs were at or below the analyte-specific TDL or contract specified MDA.

- **Completeness**

  Data Package No. H0924 (SDG No. H0924) was submitted for validation and verified for completeness. The completion rate was 100%.

MAJOR DEFICIENCIES

None found.

MINOR DEFICIENCIES

Due to a radiochemical yield of 108%, the detected isotopic uranium results in sample B0YR46 were qualified as estimates and flagged "J". Data flagged "J" is an estimate, but under the BHI validation SOW, the data may be usable for decision-making purposes. All other validated results are considered accurate within the standard error associated with the methods.

The following analytes were reported above their TDL: Uranium-238(gea) in all samples; uranium-235(aspec) in all samples; americium-241(gea) in all samples except B0YR45 and B0YR53; europium-155 in all samples except B0YR53; uranium-235(gea) in samples B0YR43, B0YR44, B0YR45, B0YR46, B0YR47, B0YR48, B0YR50 and B0YR51; europium-154 in samples B0YR44, B0YR45, B0YR46, B0YR47, B0YR48 and B0YR51; europium-152 in samples B0YR47 and B0YR48; cobalt-60 in samples B0YR45 and B0YR47; uranium-238(aspec) and uranium-233(aspec) in sample B0YR51; plutonium-238 and plutonium-239/240 in samples B0YR43 and B0YR51; cesium-137 in samples B0YR47 and B0YR51. Under the BHI statement of work, no qualifcation is required.

REFERENCES

BHI, MRB-SBB-A23665, *Validation Statement of Work*, Bechtel Hanford Incorporated, September 5, 1997.

DOE/RL-96-22, Rev. 1, *100 Area Remedial Action Sampling and Analysis Plan*, U.S. Department of Energy, May 1998.

Appendix 1

Glossary of Data Reporting Qualifiers

Qualifiers which may be applied by data validators in compliance with the BHI statement of work are as follows:

U - Indicates the compound or analyte was analyzed for and not detected above the minimum detectable activity (MDA) in the sample. The value reported is the sample result corrected for sample dilution and moisture content by the laboratory. The data is usable for decision making purposes.

UJ - Indicates the compound or analyte was analyzed for and not detected at concentrations above the minimum detectable activity (MDA) in the sample. Due to a QC deficiency identified during the data validation, the associated quantitation limit is an estimate, but is usable for decision making purposes.

J - Indicates the compound or analyte was analyzed for and detected. Due to a QC deficiency identified during the data validation, the associated concentration is an estimate, but the data are usable for decision-making purposes.

R - Indicates the compound or analyte was analyzed for, detected, and due to an identified QC deficiency, the data are unusable.

UR - Indicates the compound or analyte was analyzed for and not detected in the sample. Additionally, the data is unusable due to an identified QC deficiency.

Appendix 2

Summary of Data Qualification

DATA QUALIFICATION SUMMARY

SDG: H0924	REVIEWER: TLI	DATE: 10/6/00	PAGE 1 OF 1
COMMENTS:			
COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON
Uranium-233(aspec) Uranium-238(aspec)	J	B0YR46	Radiochemical yield

Appendix 3

Qualified Data Summary and Annotated Laboratory Reports

RADIOCHEMISTRY ANALYSIS, SOIL MATRIX, (PCi/G) Page__1 of__1

Project: BECHTEL-HANFORD																									
Laboratory: TR																									
Case	SDG: H0924																								
Sample Number		B0YR43		B0YR44		B0YR45		B0YR46		B0YR47		B0YR48		B0YR49		B0YR50		B0YR51		B0YR53					
Location		100-H-17		100-H-17		100-H-17		100-H-17		100-H-17		100-H-17		00-H-1723wew2		100-H-17		100-H-17		100-H-17					
Remarks																		Duplicate		E. Blank					
Sample Date		7/20/00		7/20/00		7/20/00		7/20/00		7/20/00		7/20/00		7/20/00		7/20/00		7/20/00		7/20/00					
Radiochemistry	CRDL	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q				
Strontium (total)	1	0.027	U	0.076	U	-0.065	U	0.028	U	0.009	U	1.07		0.217		0.112		0.054	U	-0.045	U				
Uranium-233	0.1	0.658		0.626		0.616		0.571	J	0.461		0.398		0.242		0.489		0.570	U	0.311					
Uranium-235	0.1	0.039	U	0.058	U	0.039	U	0	U	0.096	U	0	U	0.020	U	0.023	U	0.115	U	0.019	U				
Uranium-238	0.1	0.626		0.842		0.470		0.710	J	0.477		0.541		0.403		0.563		0.570	U	0.280					
Plutonium-238	0.1	-0.051	U	0.003	U	0	U	-0.024	U	-0.003	U	0.043	U	0.021	U	0.019	U	0.042	U	0	U				
Plutonium-239/40	0.1	-0.040	U	-0.006	U	-0.014	U	0.008	U	0.010	U	0	U	0.017	U	0.013	U	0.021	U	-0.017	U				
Potassium-40		14.9		12.1		12.2		14.3		11.7		14.2		15.0		14.3		15.4		4.84					
Cobalt 60	0.05	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U				
Cesium 137	0.05	0.032	U	0.104		U	U	0.072		U	U	0.526		0.100		0.054		U	U	U	U				
Radium-226		0.579		0.521		0.514		0.511		0.487		0.552		0.553		0.597		0.508		0.170					
Radium-228		0.771		0.644		0.823		0.863		0.673		0.741		0.730		0.873		0.839		0.178					
Europium 152	0.1	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U				
Europium 154	0.1	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U				
Europium 155	0.05	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U				
Thorium-228		0.655		0.650		0.712		0.677		0.685		0.757		0.677		0.728		0.681		0.174					
Thorium-232		0.771		0.644		0.823		0.863		0.673		0.741		0.730		0.873		0.839		0.178					
Uranium-235 (GEA)	0.1	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U				
Uranium-238 (GEA)	0.1	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U				
Americium-241 (GEA)	0.1	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U				

0000110

TMA / RICHMOND

SAMPLE DELIVERY GROUP H0924

R007125-01 B0YR43

DATA SHEET

SDG	7445	Client/Case no	Hanford SDG H0924
Contact	Melissa C. Mannion	Contract	TRC-SBB-207925
Lab sample id	R007125-01	Client sample id	B0YR43
Dept sample id	7445-001	Location/Matrix	100-H-17 SOLID
Received	07/25/00	Collected	07/20/00 08:35
% solids	98.9	Custody/SAF No	B99-042-043 B99-042

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALIFIERS	TEST
Total Strontium	SR-RAD	0.027	0.12	0.17	1.0	U	SR
Uranium 233	U-233/234	0.658	0.20	0.12	1.0	J	U
Uranium 235	15117-96-1	0.039	0.039	0.15	1.0	U	U
Uranium 238	U-238	0.626	0.20	0.12	1.0	J	U
Plutonium 238	13981-16-3	-0.051	0.10	0.20	1.0	U	PU
Plutonium 239/240	PU-239/240	-0.040	0.061	0.15	1.0	U	PU
Potassium 40	13966-00-2	14.9	0.76	0.38			GAM
Cobalt 60	10198-40-0	U		0.033	0.050	U	GAM
Cesium 137	10045-97-3	0.032	0.027	0.035	0.10	U	GAM
Radium 226	13982-63-3	0.579	0.077	0.071	0.10		GAM
Radium 228	15262-20-1	0.771	0.16	0.15	0.20		GAM
Europium 152	14683-23-9	U		0.079	0.10	U	GAM
Europium 154	15585-10-1	U		0.10	0.10	U	GAM
Europium 155	14391-16-3	U		0.11	0.10	U	GAM
Thorium 228	14274-82-9	0.655	0.043	0.042			GAM
Thorium 232	TH-232	0.771	0.16	0.15			GAM
Uranium 235	15117-96-1	U		0.14		U	GAM
Uranium 238	U-238	U		4.3		U	GAM
Americium 241	14596-10-2	U		0.26		U	GAM

100 H AREA - FULL PROTOCOL

10/2/00

Lab id TMANC
Protocol Hanford
Version Ver 1.0
Form DVD-DS
Version 3.06
Report date 09/05/00

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SAMPLE DELIVERY GROUP H0924

R007125-02 B0YR44

DATA SHEET

SDG	7445	Client/Case no	Hanford	SDG H0924	
Contact	Melissa C. Mannion	Contract	TRC-SBB-207925		
Lab sample id	R007125-02	Client sample id	B0YR44		
Dept sample id	7445-002	Location/Matrix	100-H-17	SOLID	
Received	07/25/00	Collected	07/20/00 08:40		
% solids	99.8	Custody/SAF No	B99-042-043	B99-042	

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALIFIERS	TEST
Total Strontium	SR-RAD	0.076	0.082	0.13	1.0	U	SR
Uranium 233	U-233/234	0.626	0.20	0.12	1.0	J	U
Uranium 235	15117-96-1	0.058	0.078	0.15	1.0	U	U
Uranium 238	U-238	0.642	0.20	0.12	1.0	J	U
Plutonium 238	13981-16-3	0.003	0.023	0.047	1.0	U	PU
Plutonium 239/240	PU-239/240	-0.006	0.017	0.044	1.0	U	PU
Potassium 40	13966-00-2	12.1	0.92	0.55			GAM
Cobalt 60	10198-40-0	U		0.047	0.050	U	GAM
Cesium 137	10045-97-3	0.104	0.030	0.035	0.10		GAM
Radium 226	13982-63-3	0.521	0.076	0.074	0.10		GAM
Radium 228	15262-20-1	0.644	0.19	0.20	0.20		GAM
Europium 152	14683-23-9	U		0.10	0.10	U	GAM
Europium 154	15585-10-1	U		0.15	0.10	U	GAM
Europium 155	14391-16-3	U		0.11	0.10	U	GAM
Thorium 228	14274-82-9	0.650	0.051	0.051			GAM
Thorium 232	TH-232	0.644	0.19	0.20			GAM
Uranium 235	15117-96-1	U		0.17		U	GAM
Uranium 238	U-238	U		5.4		U	GAM
Americium 241	14596-10-2	U		0.16		U	GAM

100 H AREA - FULL PROTOCOL

10/2/00

Lab id	TMANC
Protocol	Hanford
Version	Ver 1.0
Form	DVD-DS
Version	3.06
Report date	09/05/00

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SAMPLE DELIVERY GROUP H0924

R007125-03 B0YR45

DATA SHEET

SDG	7445	Client/Case no	Hanford SDG H0924
Contact	Melissa C. Mannion	Contract	TRC-SBB-207925
Lab sample id	R007125-03	Client sample id	B0YR45
Dept sample id	7445-003	Location/Matrix	100-H-17 SOLID
Received	07/25/00	Collected	07/20/00 08:55
% solids	99.9	Custody/SAF No	B99-042-043 B99-042

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI-FIERS	TEST
Total Strontium	SR-RAD	-0.065	0.12	0.21	1.0	U	SR
Uranium 233	U-233/234	0.616	0.20	0.12	1.0	J	U
Uranium 235	15117-96-1	0.039	0.039	0.15	1.0	U	U
Uranium 238	U-238	0.470	0.17	0.12	1.0	J	U
Plutonium 238	13981-16-3	0	0.028	0.061	1.0	U	PU
Plutonium 239/240	PU-239/240	-0.014	0.021	0.056	1.0	U	PU
Potassium 40	13966-00-2	12.2	0.92	0.61			GAM
Cobalt 60	10198-40-0	U		0.058	0.050	U	GAM
Cesium 137	10045-97-3	U		0.043	0.10	U	GAM
Radium 226	13982-63-3	0.514	0.090	0.087	0.10		GAM
Radium 228	15262-20-1	0.823	0.23	0.20	0.20		GAM
Europium 152	14683-23-9	U		0.098	0.10	U	GAM
Europium 154	15585-10-1	U		0.18	0.10	U	GAM
Europium 155	14391-16-3	U		0.083	0.10	U	GAM
Thorium 228	14274-82-9	0.712	0.070	0.069			GAM
Thorium 232	TH-232	0.823	0.23	0.20			GAM
Uranium 235	15117-96-1	U		0.13		U	GAM
Uranium 238	U-238	U		5.8		U	GAM
Americium 241	14596-10-2	U		0.053		U	GAM

100 H AREA - FULL PROTOCOL

10/2/00

Lab id	TMANC
Protocol	Hanford
Version	Ver 1.0
Form	DVD-DS
Version	3.06
Report date	09/05/00

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SAMPLE DELIVERY GROUP H0924

R007125-04 B0YR46

DATA SHEET

SDG	7445	Client/Case no	Hanford SDG H0924
Contact	Melissa C. Mannion	Contract	TRC-SBB-207925
Lab sample id	R007125-04	Client sample id	B0YR46
Dept sample id	7445-004	Location/Matrix	100-H-17 SOLID
Received	07/25/00	Collected	07/20/00 09:23
% solids	99.8	Custody/SAF No	B99-042-044 B99-042

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI-FIERS	TEST
Total Strontium	SR-RAD	0.028	0.13	0.17	1.0	U	SR
Uranium 233	U-233/234	0.571	0.17	0.11	1.0	J	U
Uranium 235	15117-96-1	0	0.034	0.13	1.0	U	U
Uranium 238	U-238	0.710	0.20	0.11	1.0	J	U
Plutonium 238	13981-16-3	-0.024	0.041	0.085	1.0	U	PU
Plutonium 239/240	PU-239/240	0.008	0.024	0.050	1.0	U	PU
Potassium 40	13966-00-2	14.3	0.80	0.37			GAM
Cobalt 60	10198-40-0	U		0.043	0.050	U	GAM
Cesium 137	10045-97-3	0.072	0.039	0.042	0.10		GAM
Radium 226	13982-63-3	0.511	0.064	0.059	0.10		GAM
Radium 228	15262-20-1	0.863	0.15	0.14	0.20		GAM
Europium 152	14683-23-9	U		0.087	0.10	U	GAM
Europium 154	15585-10-1	U		0.13	0.10	U	GAM
Europium 155	14391-16-3	U		0.13	0.10	U	GAM
Thorium 228	14274-82-9	0.677	0.045	0.044			GAM
Thorium 232	TH-232	0.863	0.15	0.14			GAM
Uranium 235	15117-96-1	U		0.15		U	GAM
Uranium 238	U-238	U		4.8		U	GAM
Americium 241	14596-10-2	U		0.28		U	GAM

100 H AREA - FULL PROTOCOL

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10/2/00

Lab id TMANC
Protocol Hanford
Version Ver 1.0
Form DVD-DS
Version 3.06
Report date 09/05/00

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SAMPLE DELIVERY GROUP H0924

R007125-05 B0YR47

DATA SHEET

SDG	7445	Client/Case no	Hanford	SDG H0924	
Contact	Melissa C. Mannion	Contract	TRC-SBB-207925		
Lab sample id	R007125-05	Client sample id	B0YR47		
Dept sample id	7445-005	Location/Matrix	100-H-17	SOLID	
Received	07/25/00	Collected	07/20/00 10:00		
% solids	98.4	Custody/SAF No	B99-042-044	B99-042	

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI-FIERS	TEST
Total Strontium	SR-RAD	0.009	0.11	0.16	1.0	U	SR
Uranium 233	U-233/234	0.461	0.19	0.12	1.0	J	U
Uranium 235	15117-96-1	0.096	0.077	0.15	1.0	U	U
Uranium 238	U-238	0.477	0.19	0.12	1.0	J	U
Plutonium 238	13981-16-3	-0.003	0.028	0.056	1.0	U	PU
Plutonium 239/240	PU-239/240	0.010	0.021	0.033	1.0	U	PU
Potassium 40	13966-00-2	11.7	1.0	0.65			GAM
Cobalt 60	10198-40-0	U		0.057	0.050	U	GAM
Cesium 137	10045-97-3	U		0.072	0.10	U	GAM
Radium 226	13982-63-3	0.487	0.094	0.094	0.10		GAM
Radium 228	15262-20-1	0.673	0.21	0.24	0.20		GAM
Europium 152	14683-23-9	U		0.12	0.10	U	GAM
Europium 154	15585-10-1	U		0.17	0.10	U	GAM
Europium 155	14391-16-3	U		0.12	0.10	U	GAM
Thorium 228	14274-82-9	0.685	0.059	0.060			GAM
Thorium 232	TH-232	0.673	0.21	0.24			GAM
Uranium 235	15117-96-1	U		0.19		U	GAM
Uranium 238	U-238	U		5.9		U	GAM
Americium 241	14596-10-2	U		0.18		U	GAM

100 H AREA - FULL PROTOCOL

10/2/00

Lab id	TMANC
Protocol	Hanford
Version	Ver 1.0
Form	DVD-DS
Version	3.06
Report date	09/05/00

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SAMPLE DELIVERY GROUP H0924

R007125-06 B0YR48

DATA SHEET

SDG	7445	Client/Case no	Hanford	SDG H0924	
Contact	Melissa C. Mannion	Contract	TRC-SBB-207925		
Lab sample id	R007125-06	Client sample id	B0YR48		
Dept sample id	7445-006	Location/Matrix	100-H-17	SOLID	
Received	07/25/00	Collected	07/20/00 09:45		
% solids	99.3	Custody/SAF No	B99-042-044	B99-042	

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI-FIERS	TEST
Total Strontium	SR-RAD	1.07	0.17	0.17	1.0		SR
Uranium 233	U-233/234	0.398	0.16	0.12	1.0	J	U
Uranium 235	15117-96-1	0	0.039	0.15	1.0	U	U
Uranium 238	U-238	0.541	0.20	0.12	1.0	J	U
Plutonium 238	13981-16-3	0.043	0.034	0.053	1.0	U	PU
Plutonium 239/240	PU-239/240	0	0.034	0.069	1.0	U	PU
Potassium 40	13966-00-2	14.2	0.83	0.40			GAM
Cobalt 60	10198-40-0	U		0.046	0.050	U	GAM
Cesium 137	10045-97-3	0.526	0.049	0.044	0.10		GAM
Radium 226	13982-63-3	0.552	0.077	0.073	0.10		GAM
Radium 228	15262-20-1	0.741	0.18	0.19	0.20		GAM
Europium 152	14683-23-9	U		0.15	0.10	U	GAM
Europium 154	15585-10-1	U		0.14	0.10	U	GAM
Europium 155	14391-16-3	U		0.14	0.10	U	GAM
Thorium 228	14274-82-9	0.757	0.054	0.054			GAM
Thorium 232	TH-232	0.741	0.18	0.19			GAM
Uranium 235	15117-96-1	U		0.18		U	GAM
Uranium 238	U-238	U		5.2		U	GAM
Americium 241	14596-10-2	U		0.32		U	GAM

100 H AREA - FULL PROTOCOL

RW 10/2/00

Lab id	TMANC
Protocol	Hanford
Version	Ver 1.0
Form	DVD-DS
Version	3.06
Report date	09/05/00

TMA / RICHMOND
SAMPLE DELIVERY GROUP H0924

R007125-07 B0YR49

DATA SHEET

SDG	7445	Client/Case no	Hanford SDG H0924
Contact	Melissa C. Mannion	Contract	TRC-SBB-207925
Lab sample id	R007125-07	Client sample id	B0YR49
Dept sample id	7445-007	Location/Matrix	100-H-17 SOLID
Received	07/25/00	Collected	07/20/00 09:47
% solids	98.9	Custody/SAF No	B99-042-045 B99-042

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALIFIERS	TEST
Total Strontium	SR-RAD	0.217	0.096	0.12	1.0	J	SR
Uranium 233	U-233/234	0.242	0.13	0.12	1.0	J	U
Uranium 235	15117-96-1	0.020	0.039	0.15	1.0	U	U
Uranium 238	U-238	0.403	0.16	0.12	1.0	J	U
Plutonium 238	13981-16-3	0.021	0.034	0.056	1.0	U	PU
Plutonium 239/240	PU-239/240	0.017	0.034	0.056	1.0	U	PU
Potassium 40	13966-00-2	15.0	0.53	0.22			GAM
Cobalt 60	10198-40-0	U		0.024	0.050	U	GAM
Cesium 137	10045-97-3	0.100	0.018	0.022	0.10		GAM
Radium 226	13982-63-3	0.553	0.049	0.046	0.10		GAM
Radium 228	15262-20-1	0.730	0.10	0.10	0.20		GAM
Europium 152	14683-23-9	U		0.057	0.10	U	GAM
Europium 154	15585-10-1	U		0.079	0.10	U	GAM
Europium 155	14391-16-3	U		0.081	0.10	U	GAM
Thorium 228	14274-82-9	0.677	0.032	0.031			GAM
Thorium 232	TH-232	0.730	0.10	0.10			GAM
Uranium 235	15117-96-1	U		0.10		U	GAM
Uranium 238	U-238	U		3.0		U	GAM
Americium 241	14596-10-2	U		0.18		U	GAM

100 H AREA - FULL PROTOCOL

10/2/00

Lab id	TMANC
Protocol	Hanford
Version	Ver 1.0
Form	DVD-DS
Version	3.06
Report date	09/05/00

TMA / RICHMOND
SAMPLE DELIVERY GROUP H0924

R007125-08 B0YR50

DATA SHEET

SDG	7445	Client/Case no	Hanford SDG H0924
Contact	Melissa C. Mannion	Contract	TRC-SBB-207925
Lab sample id	R007125-08	Client sample id	B0YR50
Dept sample id	7445-008	Location/Matrix	100-H-17 SOLID
Received	07/25/00	Collected	07/20/00 09:30
% solids	99.1	Custody/SAF No	B99-042-045 B99-042

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI-FIERS	TEST
Total Strontium	SR-RAD	0.112	0.081	0.11	1.0	J	SR
Uranium 233	U-233/234	0.469	0.19	0.14	1.0	J	U
Uranium 235	15117-96-1	0.023	0.045	0.17	1.0	U	U
Uranium 238	U-238	0.563	0.19	0.14	1.0	J	U
Plutonium 238	13981-16-3	0.019	0.032	0.057	1.0	U	PU
Plutonium 239/240	PU-239/240	0.013	0.019	0.035	1.0	U	PU
Potassium 40	13966-00-2	14.3	0.73	0.36			GAM
Cobalt 60	10198-40-0	U		0.036	0.050	U	GAM
Cesium 137	10045-97-3	0.054	0.029	0.032	0.10	J	GAM
Radium 226	13982-63-3	0.597	0.064	0.059	0.10		GAM
Radium 228	15262-20-1	0.873	0.14	0.13	0.20		GAM
Europium 152	14683-23-9	U		0.081	0.10	U	GAM
Europium 154	15585-10-1	U		0.10	0.10	U	GAM
Europium 155	14391-16-3	U		0.11	0.10	U	GAM
Thorium 228	14274-82-9	0.728	0.040	0.039			GAM
Thorium 232	TH-232	0.873	0.14	0.13			GAM
Uranium 235	15117-96-1	U		0.14		U	GAM
Uranium 238	U-238	U		4.2		U	GAM
Americium 241	14596-10-2	U		0.26		U	GAM

100 H AREA - FULL PROTOCOL

10/2/00

Lab id	TMANC
Protocol	Hanford
Version	Ver 1.0
Form	DVD-DS
Version	3.06
Report date	09/05/00

TMA / RICHMOND

SAMPLE DELIVERY GROUP H0924

R007125-09 B0YR51

DATA SHEET

SDG	7445	Client/Case no	Hanford SDG H0924
Contact	Melissa C. Mannion	Contract	TRC-SBB-207925
Lab sample id	R007125-09	Client sample id	B0YR51
Dept sample id	7445-009	Location/Matrix	100-H-17 SOLID
Received	07/25/00	Collected	07/20/00 09:23
% solids	99.8	Custody/SAF No	B99-042-045 B99-042

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI-FIERS	TEST
Total Strontium	SR-RAD	0.054	0.42	0.74	1.0	U	SR
Uranium 233	U-233/234	0.570	0.57	0.91	1.0	U	U
Uranium 235	15117-96-1	0.115	0.46	0.88	1.0	U	U
Uranium 238	U-238	0.570	0.57	0.73	1.0	U	U
Plutonium 238	13981-16-3	0.042	0.17	0.32	1.0	U	PU
Plutonium 239/240	PU-239/240	0.021	0.12	0.26	1.0	U	PU
Potassium 40	13966-00-2	15.4	0.88	0.31			GAM
Cobalt 60	10198-40-0	U		0.045	0.050	U	GAM
Cesium 137	10045-97-3	U		0.055	0.10	U	GAM
Radium 226	13982-63-3	0.508	0.074	0.068	0.10		GAM
Radium 228	15262-20-1	0.839	0.18	0.17	0.20		GAM
Europium 152	14683-23-9	U		0.098	0.10	U	GAM
Europium 154	15585-10-1	U		0.16	0.10	U	GAM
Europium 155	14391-16-3	U		0.14	0.10	U	GAM
Thorium 228	14274-82-9	0.681	0.051	0.050			GAM
Thorium 232	TH-232	0.839	0.18	0.17			GAM
Uranium 235	15117-96-1	U		0.17		U	GAM
Uranium 238	U-238	U		5.0		U	GAM
Americium 241	14596-10-2	U		0.31		U	GAM

100 H AREA - FULL PROTOCOL

10/2/00

Lab id	TMANC
Protocol	Hanford
Version	Ver 1.0
Form	DVD-DS
Version	3.06
Report date	09/05/00

TMA / RICHMOND
SAMPLE DELIVERY GROUP H0924

R007125-10 B0YR53

DATA SHEET

SDG 7445	Client/Case no Hanford	SDG H0924	
Contact Melissa C. Mannion	Contract TRC-SBB-207925		
Lab sample id R007125-10	Client sample id B0YR53		
Dept sample id 7445-010	Location/Matrix 100-H-17	SOLID	
Received 07/25/00	Collected 07/20/00 08:27		
% solids 100.0	Custody/SAF No B99-042-045	B99-042	

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI-FIERS	TEST
Total Strontium	SR-RAD	-0.045	0.10	0.15	1.0	U	SR
Uranium 233	U-233/234	0.311	0.16	0.12	1.0	J	U
Uranium 235	15117-96-1	0.019	0.038	0.14	1.0	U	U
Uranium 238	U-238	0.280	0.13	0.12	1.0	J	U
Plutonium 238	13981-16-3	0	0.035	0.071	1.0	U	PU
Plutonium 239/240	PU-239/240	-0.017	0.023	0.071	1.0	U	PU
Potassium 40	13966-00-2	4.84	0.26	0.13			GAM
Cobalt 60	10198-40-0	U		0.014	0.050	U	GAM
Cesium 137	10045-97-3	U		0.011	0.10	U	GAM
Radium 226	13982-63-3	0.170	0.025	0.023	0.10		GAM
Radium 228	15262-20-1	0.178	0.049	0.053	0.20	J	GAM
Europium 152	14683-23-9	U		0.030	0.10	U	GAM
Europium 154	15585-10-1	U		0.043	0.10	U	GAM
Europium 155	14391-16-3	U		0.042	0.10	U	GAM
Thorium 228	14274-82-9	0.174	0.016	0.017			GAM
Thorium 232	TH-232	0.178	0.049	0.053			GAM
Uranium 235	15117-96-1	U		0.053		U	GAM
Uranium 238	U-238	U		1.6		U	GAM
Americium 241	14596-10-2	U		0.095		U	GAM

100 H AREA - FULL PROTOCOL

10/2/00

Lab id	TMANC
Protocol	Hanford
Version	Ver 1.0
Form	DVD-DS
Version	3.06
Report date	09/05/00

Appendix 4

Laboratory Narrative and Chain-of-Custody Documentation

1.0 GENERAL

Bechtel Hanford Inc. (BHI) Sample Delivery Group H0924 was composed of ten solid (soil) samples designated under SAF No. B99-042 with a Project Designation of: 100 H Area – Full Protocol.

The samples were received as stated on the Chain-of-Custody documents. Any discrepancies are noted on the Thermo Retec Sample Receipt Checklist. The results were transmitted to BHI via e-Fax on August 14, 30, and September 5, 2000.

2.0 ANALYSIS NOTES

2.1 Total Strontium Analyses

No problems were encountered during the course of the analyses.

2.2 Isotopic Uranium Analyses

Isotopic Uranium was requested by BHI on August 17, 2000.

No problems were encountered during the course of the analyses.

2.3 Isotopic Plutonium Analyses

Isotopic Plutonium was requested by BHI on August 17, 2000.

No problems were encountered during the course of the analyses.

2.4 Gamma Spectroscopy Analyses

No problems were encountered during the course of the analyses.

Bechtel Hanford Inc. — **CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST**

Collector: Renee Nelson / M. Stankovich	Company Contact: Mike Stankovich	Telephone No.: 531-7620	Project Coordinator: TRENT, SJ
Project Designation: 100 H Area - Full Protocol	Sampling Location: 100-H-17 H0924 (7445)		SAF No.: B99-042
Ice Chest No.: ERC99-042 Jar2	Field Logbook No.: EL-1500-2	COA: R00H172600	Method of Shipment: Federal Express
Shipped To: TMA/RECRA TMA	Offsite Property No.: A0000254		Bill of Lading/Air Bill No.: 4285 7953 7423

Price Code: 8L — Data Turnaround: 21 Days — Air Quality: ☐

POSSIBLE SAMPLE HAZARDS/REMARKS

none

Special Handling and/or Storage

Preservation	None	4C	None	None							
Type of Container	G	G	G	P							
No. of Container(s)	1	1	1	1							
Volume	60mL	125mL	250mL	1000mL							

SAMPLE ANALYSIS

Sample No.	Matrix *	Sample Date	Sample Time									
00YR49	SOIL	7/20/00	0947	X			X					B7
00YR50	SOIL	7/20/00	0930	X			X					B8
00YR51	SOIL	7/20/00	0923	X			X					
00YR53	SOIL	7/20/00	0827	X			X					

CHAIN OF POSSESSION — **Sign/Print Names**

Relinquished By	Date/Time	Received By	Date/Time
R. Nelson / R. Nelson	7/20/00 1554	R. Thorne	7/20/00 1534
R. Thorne	7/20/00 1430	FEDEX	7/24/00
FED EXPRESS	7/25/00 9:30	E. Aguirre	7/25/00 9:30

SPECIAL INSTRUCTIONS

RT 104.00 RJN 7/20/00

(1) ICP Metals-6010A (Separately Analyze Arsenic, Chromium, Lead); Mercury-7471A (CVAA)
(2) Gamma Spectroscopy (Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155)

FAXED 7/25/00

Matrix *: A=Air, DI=Drum Solids, DL=Drum Liquids, T=Tissue, W=Water, L=Liquid, V=Vegetation, O=Other

LABORATORY SECTION	Received By	Title		Date/Time
FINAL SAMPLE DISPOSITION	Disposal Method		Disposed By	Date/Time

BHI-EE-011 (10/99)

Bechtel Hanford Inc. — **CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST**

Collector: Renee Nielson / M. Stankovich	Company Contact: Mike Stankovich; Telephone No. 531-7620	Project Coordinator: TRENT, SJ	Price Code 8L; Data Turnaround 21 Days
Project Designation: 100 H Area - Full Protocol	Sampling Location: 100-H-17 H0924 (7445)	SAF No. B99-042	Air Quality ☐
Ice Chest No. ERC 99-043 2 of 2	Field Logbook No. EL-1500-2; COA R00H172600	Method of Shipment: Federal Express	
Shipped To: TMA/RECRA TMA	Offsite Property No. A000254	Bill of Lading/Air Bill No. 4235 7953 7423	

POSSIBLE SAMPLE HAZARDS/REMARKS: None

Special Handling and/or Storage

00024

Preservation	None	Cool 4C	None	None
Type of Container	aG	aG	aG	P
No. of Container(s)	1	1	1	1
Volume	60mL	125mL	250mL	1000mL
SAMPLE ANALYSIS	Strontium-89,90 – Total Sr; Nickel-63; Technetium-99 RJN 7/20/00	Chromium Hex - 7196	See item (1) in Special Instructions.	See item (2) in Special Instructions.

Sample No.	Matrix *	Sample Date	Sample Time					
B0YR46	SOIL	7/20/00	0923	X			X	A4
B0YR47	SOIL	7/20/00	1000	X			X	B5
B0YR48	SOIL	7/20/00	0945	X			X	B6

CHAIN OF POSSESSION — Sign/Print Names

Relinquished By	Date/Time	Received By	Date/Time
R. Nielson / R. Nielson	7/20/00 1534	R. Thoren / R. Thoren	7-20-00 1534
R. Thoren	7-24-00 1430	FED EX	7/24/00
FED. EXPRESS	7/25/00 9:30	E. Aguirre	7/25/00 9:30

SPECIAL INSTRUCTIONS: RT 7-24-00 7/20/00 RJN

~~(1) ICP Metals - 6010A (Supertrace) (Arsenic, Chromium, Lead); Mercury - 7471 - (CA)~~

(2) Gamma Spectroscopy (Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155)

FAXED 7/25/00

Matrix *: S=Soil, SE=Sediment, SO=Solid, SL=Sludge, W=Water, O=Oil, A=Air, DS=Drum Solids, DL=Drum Liquids, T=Tissue, WI=Wipe, L=Liquid, V=Vegetation, X=Other

LABORATORY SECTION	Received By	Title	Date/Time
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

BHI-EE-011 (10/99)

Bechtel Hanford Inc.

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

Collector: Renee Nielson / Stankovich	Company Contact: Mike Stankovich — Telephone No.: 531-7620	Project Coordinator: TRENT, SJ	Price Code: 8L — Data Turnaround: 21 Days
Project Designation: 100 H Area - Full Protocol	Sampling Location: 100-H-17 — H0924 (7445)	SAF No.: B99-042	Air Quality ☐
Ice Chest No.: ERC99-043(2072)	Field Logbook No.: EL-1500-2 — COA: R00H172600	Method of Shipment: Federal Express	
Shipped To: TMA/RECRA — TMA	Offsite Property No.: A000254	Bill of Lading/Air Bill No.: 4235 1953 7423	

POSSIBLE SAMPLE HAZARDS/REMARKS: None

Special Handling and/or Storage:

000025

SAMPLE ANALYSIS					
Preservation	None	Cool 4C	None	None	
Type of Container	aG	G/P	G	P	
No. of Container(s)	1	1	1	1	
Volume	60mL	125mL	250mL	1000mL	
Analysis	Strontium-89,90 – Total Sr; Nickel-63; [illegible] RJN 7/20/00	Chromium Hex - 7196	See item (1) in Special Instructions.	See item (2) in Special Instructions.	

Columns 2 and 3 struck through, marked "RJN 7/20/00".

Sample No.	Matrix *	Sample Date	Sample Time					
B0YR43	SOIL	7/20/00	0835	X			X	A1
B0YR44	SOIL	7/20/00	0840	X			X	A2
B0YR45	SOIL	7/20/00	0855	X			X	A3

CHAIN OF POSSESSION — Relinquished By	Date/Time	Received By	Date/Time
M Stankovich / R. Nielson	7/20/00 1534	R. Thorne / R. Thorne	7-20-00 1534
R. Thorne / R. Thorne	7-24-00 1430	Fed Ex	7/24/00
Fed. Express	7/25/00 9:30	E. Aguirre	7/25/00 9:30

SPECIAL INSTRUCTIONS — PT 7-24-00 RJN 7/20/00

~~(1) ICP Metals - 6010A (Supertrace) (Arsenic, Chromium, Lead); Mercury - 7471 - (CA)~~

(2) Gamma Spectroscopy (Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155)

FAXED 7/25/00

Matrix *: S=Soil, SE=Sediment, SO=Solid, SL=Sludge, W=Water, O=Oil, A=Air, DS=Drum Solids, DL=Drum Liquids, T=Tissue, WI=Wipe, L=Liquid, V=Vegetation, X=Other

LABORATORY SECTION	Received By	Title	Date/Time
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

BHI-EE-011 (10/99)

Appendix 5

Data Validation Supporting Documentation

RADIOCHEMICAL DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	(C)	D	E
PROJECT: 100 H 100-H-17			DATA PACKAGE: H0924		
VALIDATOR: TLI		LAB: TR		DATE: 9/25/00	
CASE:			SDG: H0924		

ANALYSES PERFORMED

☐ Gross Alpha/Beta	☒ Strontium-90	☐ Technetium-99	☒ Alpha Spectroscopy	☒ Gamma Spectroscopy	
☐ Total Uranium	☐ Radium-22	☐ Tritium	☐		

SAMPLES/MATRIX B04R43 B04R44 B04R45 B04R46
B04R47 B04R48 B04R49 B04R50
B04R51 B04R53

Soil

1. Completeness . . . . . ☒ N/A

Technical verification forms present? . . . . . Yes No N/A

Comments: _____

2. Initial Calibration . . . . . ☒ N/A

Instruments/detectors calibrated within one year of sample analysis? . . . . . Yes No N/A

Initial calibration acceptable? . . . . . Yes No N/A

Standards NIST traceable? . . . . . Yes No N/A

Standards Expired? . . . . . Yes No N/A

Comments: _____

AR

3. Continuing Calibration . . . . . ☒ N/A

Calibration checked within one week of sample analysis? . . .	Yes	No	N/A
Calibration check acceptable?	Yes	No	N/A
Calibration check standards NIST traceable?	Yes	No	N/A
Calibration check standards expired?	Yes	No	N/A

Comments:_____

4. Blanks . . . . . ☐ N/A

Method blank analyzed?	(Yes)	No	N/A
Method blank results acceptable?	(Yes)	No	N/A
Analytes detected in method blank?	Yes	(No)	N/A
Field blank(s) analyzed?	Yes	No	N/A
Field blank results acceptable?	Yes	No	N/A
Analytes detected in field blank(s)?	Yes	No	N/A
Transcription/Calculation Errors?	Yes	No	N/A

Comments:_____

5. Matrix Spikes . . . . . ☒ N/A

Matrix spike analyzed?	Yes	No	N/A
Spike recoveries acceptable?	Yes	No	N/A
Spike source traceable?	Yes	No	N/A
Spike source expired?	Yes	No	N/A
Transcription/Calculation Errors?	Yes	No	N/A

Comments:_____

6. Laboratory Control Samples . . . . . ☐ N/A

LCS analyzed? . . . . . (Yes) No N/A
LCS recoveries acceptable? . . . . . (Yes) No N/A
LCS traceable? . . . . . Yes No (N/A)
Transcription/Calculation Errors? . . . . . Yes No (N/A)

Comments:_____

7. Chemical Recovery . . . . . ☐ N/A

Chemical carrier added? . . . . . (Yes) No N/A
Chemical recovery acceptable? . . . . . Yes (No) N/A
Chemical carrier traceable? . . . . . Yes No (N/A)
Chemical carrier expired? . . . . . Yes No (N/A)
Transcription/Calculation errors? . . . . . Yes No (N/A)

Comments: B04R44 - 10870 J 233 & 238

8. Duplicates . . . . . ☐ N/A

Duplicates Analyzed? . . . . . (Yes) No N/A
RPD Values Acceptable? . . . . . (Yes) No N/A
Transcription/Calculation Errors? . . . . . Yes No (N/A)

Comments:_____

9. Field QC Samples . . . . . ☐ N/A

Field duplicate sample(s) analyzed?	Yes	No	N/A
Field duplicate RPD values acceptable?	Yes	No	N/A
Field split sample(s) analyzed?	Yes	No	N/A
Field split RPD values acceptable?	Yes	No	N/A
Performance audit sample(s) analyzed?	Yes	No	N/A
Performance audit sample results acceptable?	Yes	No	N/A

Comments:_____

10. Holding Times

Are sample holding times acceptable?	Yes	No	N/A

Comments:_____

11. Results and Detection Limits (Levels D & E) . . . . . ☐ N/A

Results reported for all required sample analyses?	Yes	No	N/A
Results supported in raw data?	Yes	No	N/A
Results Acceptable?	Yes	No	N/A
Transcription/Calculation errors?	Yes	No	N/A
MDA's meet required detection limits?	Yes	No	N/A
Transcription/calculation errors?	Yes	No	N/A

Comments:_____

TMA/RICHMOND

SAMPLE DELIVERY GROUP H0924

METHOD SUMMARY

URANIUM, ISOTOPIC IN SOIL

ALPHA SPECTROSCOPY

Test U Matrix SOLID
SDG 7445
Contact Melissa C. Mannion

Client Hanford
Contract TRC-SBB-207925
Contract SDG H0924

METHOD PERFORMANCE

CLIENT SAMPLE ID	LAB SAMPLE ID	RAN TEST	SUP-FIX	MAX MDA pCi/g	ALIQ g	PREP FAC	DILU-TION	YIELD %	EFF %	COUNT min	FWHM keV	DRIFT KeV	DAYS HELD	PREPARED	ANAL-YZED	DETECTOR
Preparation batch 6929-063 2s prep error 5.0 % Reference Lab Notebook 6929 pg. 063																
B0YR43	R007125-01			0.15	0.500			92		155			29	08/18/00	08/18	SS-039
B0YR44	R007125-02			0.15	0.500			89		157			33	08/18/00	08/22	SS-031
B0YR45	R007125-03			0.15	0.500			91		155			29	08/18/00	08/18	SS-041
B0YR46	R007125-04			0.13	0.500			108		155			29	08/18/00	08/18	SS-042
B0YR47	R007125-05			0.15	0.500			97		155			29	08/18/00	08/18	SS-043
B0YR48	R007125-06			0.15	0.500			97		155			29	08/18/00	08/18	SS-044
B0YR49	R007125-07			0.15	0.500			95		155			29	08/18/00	08/18	SS-045
B0YR50	R007125-08			0.17	0.500			81		155			29	08/18/00	08/18	SS-046
B0YR51	R007125-09			0.91	0.100			83		155			29	08/18/00	08/18	SS-047
B0YR53	R007125-10			0.14	0.500			98		155			29	08/18/00	08/18	SS-048
BLK (QC ID=35543)	R007125-15			0.76	0.100			97		155				08/18/00	08/18	SS-050
LCS (QC ID=35542)	R007125-14			2.6	0.100			102		155				08/18/00	08/18	SS-049
Duplicate (R007125-07) (QC ID=35544)	R007125-16			0.24	0.500			81		154			29	08/18/00	08/18	SS-020
Nominal values and limits from method				1.0	0.100			20-105		150	100		180			

PROCEDURES REFERENCE UISO_PLATE_AEA
CP-911 Uranium in Water and Dissolved Sample by Extraction Chromatography, rev 2
CP-008 Heavy Element Electroplating, rev 3

AVERAGES ± 2 SD FOR 13 SAMPLES
MDA 0.45 ± 1.4
YIELD 93 ± 16

Lab id TMARC
Protocol Hanford
Version Ver 1.0
Form DVD-CNS
Version 3.06
Report date 09/05/00

TMA / RICHMOND
SAMPLE DELIVERY GROUP H0924

R007125-12 Method Blank

METHOD BLANK

SDG 7445 Client/Case no Hanford SDG H0924
Contact Melissa C. Mannion Contract TRC-SBB-207925

Lab sample id R007125-12 Client sample id Method Blank
Dept sample id 7445-012 Material/Matrix SOLID
SAF No B99-042

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI-FIERS	TEST
Total Strontium	SR-RAD	-0.307	0.57	0.79	1.0	U	SR
Potassium 40	13966-00-2	U		0.31		U	GAM
Cobalt 60	10198-40-0	U		0.020	0.050	U	GAM
Cesium 137	10045-97-3	U		0.015	0.10	U	GAM
Radium 226	13982-63-3	U		0.031	0.10	U	GAM
Radium 228	15262-20-1	U		0.072	0.20	U	GAM
Europium 152	14683-23-9	U		0.040	0.10	U	GAM
Europium 154	15585-10-1	U		0.053	0.10	U	GAM
Europium 155	14391-16-3	U		0.051	0.10	U	GAM
Thorium 228	14274-82-9	U		0.024		U	GAM
Thorium 232	TH-232	U		0.072		U	GAM
Uranium 235	15117-96-1	U		0.066		U	GAM
Uranium 238	U-238	U		1.9		U	GAM
Americium 241	14596-10-2	U		0.12		U	GAM

100 H AREA - FULL PROTOCOL

QC-BLANK #35249

R007125-15 Method Blank

METHOD BLANK

SDG 7445	Client/Case no Hanford		SDG H0924
Contact Melissa C. Mannion	Contract TRC-SBB-207925		
Lab sample id R007125-15	Client sample id Method Blank		
Dept sample id 7445-015	Material/Matrix		SOLID
	SAF No B99-042		

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALIFIERS	TEST
Uranium 233	U-233/234	0.082	0.16	0.63	1.0	U	U
Uranium 235	15117-96-1	0	0.20	0.76	1.0	U	U
Uranium 238	U-238	0	0.16	0.63	1.0	U	U
Plutonium 238	13981-16-3	0.052	0.16	0.32	1.0	U	PU
Plutonium 239/240	PU-239/240	-0.026	0.21	0.40	1.0	U	PU

100 H AREA - FULL PROTOCOL

BLANK
QC-BLANK #35543

Lab id TMANC
Protocol Hanford
Version Ver 1.0
Form DVD-DS
Version 3.06
Report date 09/05/00

TMA/RICHMOND

SAMPLE DELIVERY GROUP H0924

R007125-11 Lab Control Sample

LAB CONTROL SAMPLE

SDG 7445 Client/Case no Hanford SDG H0924
Contact Melissa C. Mannion Case no TRC-SBB-207925

Lab sample id R007125-11 Client sample id Lab Control Sample
Dept sample id 7445-011 Material/Matrix SOLID
SAF No B99-042

ANALYTE	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	MDL pCi/g	QUALI-FIERS	TEST	ADDED pCi/g	2σ ERR pCi/g	REC %	3σ LMTS (TOTAL)	PROTOCOL LIMITS
Total Strontium	63.8	2.0	0.82	1.0		SR	55.5	2.2	115	81-119	80-120
Cobalt 60	0.269	0.048	0.029	0.050		GAM	0.307	0.012	88	69-131	80-120
Cesium 137	0.376	0.049	0.038	0.10		GAM	0.365	0.015	103	69-131	80-120

100 H AREA - FULL PROTOCOL

QC-LCS #35248

LAB CONTROL SAMPLES
Page 1
SUMMARY DATA SECTION
Page 11

Lab id TMARC
Protocol Hanford
Version Ver 1.0
Form DVD-LCS
Version 3.06
Report date 09/05/00

TMA/RICHMOND

SAMPLE DELIVERY GROUP H0924

R007125-14

Lab Control Sample

LAB CONTROL SAMPLE

SDG 7445
Contact Melissa C. Mannion

Client/Case no Hanford SDG H0924
Case no TRC-SBB-207925

Lab sample id R007125-14
Dept sample id 7445-014

Client sample id Lab Control Sample
Material/Matrix SOLID
SAF No B99-042

ANALYTE	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALIFIERS	TEST	ADDED pCi/g	2σ ERR pCi/g	REC %	3σ LMTS (TOTAL)	PROTOCOL LIMITS
Uranium 233	48.4	5.7	2.6	1.0		U	46.4	1.9	104	79-121	80-120
Uranium 235	36.3	4.7	0.71	1.0		U	37.7	1.5	96	79-121	80-120
Uranium 238	50.8	5.8	2.5	1.0		U	50.4	2.0	101	80-120	80-120
Plutonium 238	64.2	5.0	0.44	1.0		PU	62.2	2.5	103	84-116	80-120
Plutonium 239/240	63.4	4.9	0.29	1.0		PU	66.1	2.6	96	86-114	80-120

100 H AREA - FULL PROTOCOL

LCS
QC-LCS #35542

Lab id TMARC
Protocol Hanford
Version Ver 1.0
Form DVD-LCS
Version 1.06
Report date 09/05/00

TMA/RICHMOND

SAMPLE DELIVERY GROUP H0924

R007125-13 B0YR49

DUPLICATE

SDG 7445 Client/Case no Hanford SDG H0924

Contact Melissa C. Mannion Case no TRC-SBB-207925

DUPLICATE		ORIGINAL			
Lab sample id	R007125-13	Lab sample id	R007125-07	Client sample id	B0YR49
Dept sample id	7445-013	Dept sample id	7445-007	Location/Matrix	100-H-17 SOLID
		Received	07/25/00	Collected	07/20/00 09:47
		% solids	98.9	Custody/SAF No	B99-042-045 B99-042

ANALYTE	DUPLICATE pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI-FIERS	TEST	ORIGINAL pCi/g	2σ ERR (COUNT)	MDA pCi/g	QUALI-FIERS	RPD %	3σ PROT TOT LIMIT
Total Strontium	0.196	0.081	0.12	1.0	J	SR	0.217	0.096	0.12	J	10	94
Potassium 40	16.3	0.82	0.31			GAM	15.0	0.53	0.22		8	33
Cobalt 60	U		0.033	0.050	U	GAM	U		0.024	U	-	
Cesium 137	0.119	0.029	0.033	0.10		GAM	0.100	0.018	0.022		17	57
Radium 226	0.564	0.064	0.061	0.10		GAM	0.553	0.049	0.046		2	38
Radium 228	0.684	0.15	0.16	0.20		GAM	0.730	0.10	0.10		7	50
Europium 152	U		0.073	0.10	U	GAM	U		0.057	U	-	
Europium 154	U		0.12	0.10	U	GAM	U		0.079	U	-	
Europium 155	U		0.067	0.10	U	GAM	U		0.081	U	-	
Thorium 228	0.880	0.060	0.059			GAM	0.677	0.032	0.031		26	35
Thorium 232	0.684	0.15	0.16			GAM	0.730	0.10	0.10		7	50
Uranium 235	U		0.11		U	GAM	U		0.10	U	-	
Uranium 238	U		3.8		U	GAM	U		3.0	U	-	
Americium 241	U		0.042		U	GAM	U		0.18	U	-	

100 H AREA - FULL PROTOCOL

QC-DUP#7 35250

Lab id TMARC
Protocol Hanford
Version Ver 1.0
Form DVD-DUP
Version 1.06
Report date 09/05/00

TMA/RICHMOND

SAMPLE DELIVERY GROUP H0924

R007125-16 B0YR49

DUPLICATE

SDG 7445 Client/Case no Hanford SDG H0924

Contact Melissa C. Mannion Case no TRC-SBR-207925

DUPLICATE		ORIGINAL			
Lab sample id	R007125-16	Lab sample id	R007125-07	Client sample id	B0YR49
Dept sample id	7445-016	Dept sample id	7445-007	Location/Matrix	100-H-17 SOLID
		Received	07/25/00	Collected	07/20/00 09:47
		% solids	98.9	Custody/SAP No	B99-042-045 B99-042

ANALYTE	DUPLICATE pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI-FIERS	TEST	ORIGINAL pCi/g	2σ ERR (COUNT)	MDA pCi/g	QUALI-FIERS	RPD %	3σ PROT TOT LIMIT
Uranium 233	0.312	0.16	0.20	1.0	J	U	0.242	0.13	0.12	J	25	112
Uranium 235	0.063	0.063	0.24	1.0	U	U	0.020	0.039	0.15	U	-	
Uranium 238	0.521	0.22	0.20	1.0	J	U	0.403	0.16	0.12	J	26	89
Plutonium 238	-0.010	0.015	0.042	1.0	U	PU	0.021	0.034	0.056	U	-	
Plutonium 239/240	0	0.021	0.039	1.0	U	PU	0.017	0.034	0.056	U	-	

100 H AREA - FULL PROTOCOL

DUP#7
QC-DUP#7 35544

Lab id TMARC
Protocol Hanford
Version Ver 1.0
Form DVD-DUP
Version 3.06
Report date 09/05/00

Date: 6 October 2000
To: Bechtel Hanford Inc. (technical representative)
From: TechLaw, Inc.
Project: 100-H Areas - Full Protocol - Waste Site 100-H-17
Subject: Inorganics - Data Package No. H0924-RLN (SDG No. H0924)

INTRODUCTION

This memo presents the results of data validation on Data Package No. H0924-RLN prepared by RECRA LabNet (RLN). A list of samples validated along with the analyses reported and the method of analysis is provided in the following table.

Sample ID	Sample Date	Media	Validation	Analysis
B0YR43	7/20/00	Soil	C	See note 1
B0YR44	7/20/00	Soil	C	See note 1
B0YR45	7/20/00	Soil	C	See note 1
B0YR46	7/20/00	Soil	C	See note 1
B0YR47	7/20/00	Soil	C	See note 1
B0YR48	7/20/00	Soil	C	See note 1
B0YR49	7/20/00	Soil	C	See note 1
B0YR50	7/20/00	Soil	C	See note 1
B0YR51	7/20/00	Soil	C	See note 1
B0YR53	7/20/00	Soil	C	See note 1

1 - Chromium VI by 7196A; ICP metals (arsenic, chromium and lead) by 6010B

Data validation was conducted in accordance with the BHI validation statement of work and the 100 Area Remedial Action Sampling and Analysis Plan (DOE/RL May 1998). Appendices 1 through 5 provide the following information as indicated below:

Appendix 1. Glossary of Data Reporting Qualifiers
Appendix 2. Summary of Data Qualification
Appendix 3. Qualified Data Summary and Annotated Laboratory Reports
Appendix 4. Laboratory Narrative and Chain-of-Custody Documentation
Appendix 5. Data Validation Supporting Documentation

DATA QUALITY OBJECTIVES

- **Holding Times**

  Analytical holding times for metals are assessed to ascertain whether the holding time requirements were met by the laboratory. The holding time requirements are as follows: Soil samples must be analyzed within six months for ICP metals and 30 days for chromium VI.

  All holding times were acceptable.

- **Blanks**

  Preparation Blanks

  At least one preparation blank, consisting of deionized distilled water processed through each sample preparation and analysis procedure, must be prepared and analyzed with every sample delivery group. In the case of positive blank results, samples with digestate concentrations less than five times the preparation blank value have had their associated values qualified as non-detected and flagged "U". Samples with concentrations of greater than five times the highest blank concentration do not require qualification.

  In the case of negative blank results, if the absolute value exceeds the Contract Required Detection Limit (CRDL), all nondetects are rejected and flagged "UR" and all detects that are less than ten times the absolute value of the associated preparation blank result are qualified as estimates and flagged "J". If the absolute value of the negative preparation blank is greater than the IDL and less than or equal to the CRDL, all nondetects are qualified as estimates and flagged "UJ" and all detects less than ten times the absolute value of the blank are qualified as estimates and flagged "J". If the sample results are greater than ten times the absolute value of the preparation blank, no qualification is necessary.

  All preparation blank results were acceptable although the TDL was exceeded for chromium VI.

  Equipment Blank

  One equipment blank (B0YR53) was submitted for analysis. Chromium and lead were detected in the equipment blank. Under the BHI statement of work, no qualification is required.

- **Accuracy**

  Matrix Spike

  Matrix spike analyses are used to assess the analytical accuracy of the reported data and the effect of the matrix on the ability to accurately quantify sample concentrations. Matrix spike recoveries must fall within the range of 70% to 130%. Samples with a spike recovery of less than 30% and a sample result below the IDL are rejected and flagged "UR". Samples with a spike recovery of 30% to 69% and a sample result less than the IDL are qualified "UJ". Samples with a spike recovery of greater than 130% or less than 70% and a sample result greater than the IDL are qualified as estimates and flagged "J". Finally, for samples with a spike recovery greater than 130% and a sample result less than the IDL, no qualification is required.

  All matrix spike recovery results were acceptable.

- **Precision**

  Laboratory Duplicate Samples

  Laboratory duplicate sample analyses are used to measure laboratory precision and sample homogeneity. Results must be within RPD limits of plus or minus 30% for solid samples. If RPD values are out of specification and the sample concentration is greater than five times the CRDL, all associated sample results are qualified as estimated and flagged "J". If RPD values are plus or minus two times the CRDL and the sample concentration is less than five times the CRDL, all associated sample results are qualified as estimated and flagged "J/UJ". The performance criteria for aqueous laboratory duplicates are an RPD less than 30% for positive sample results greater than five times the CRDL or plus or minus the CRDL for positive sample results less than five times the CRDL. Sample results outside the criteria are qualified as estimates and flagged "J/UJ".

  All laboratory duplicate results were acceptable.

  Field Duplicates

  One set of field duplicates (B0YR46/B0YR51) were submitted for analysis. The results were compared using the same criteria as for a laboratory duplicate. All field duplicate results were acceptable.

- **Analytical Detection Levels**

Reported analytical detection levels are compared against the 100 Area Remedial Action Sampling and Analysis Plan TDLs or the CRDL if no TDL was specified, to

ensure that laboratory detection levels meet the required criteria. The TDL was exceeded for chromium VI in all undetected samples. Under the BHI statement of work, no qualification is required.

- **Completeness**

Data package No. H0924-RLN (SDG No. H0924) was submitted for validation and verified for completeness. The completion percentage was 100%.

MAJOR DEFICIENCIES

None found.

MINOR DEFICIENCIES

The TDL was exceeded for chromium VI in all undetected samples. Under the BHI statement of work, no qualification is required.

REFERENCES

BHI, MRB-SBB-A23665, *Validation Statement of Work*, Bechtel Hanford Incorporated, September 5, 1997.

DOE/RL-96-22, Rev. 1, *100 Area Remedial Action Sampling and Analysis Plan*, U.S. Department of Energy, May 1998.

Appendix 1

Glossary of Data Reporting Qualifiers

Qualifiers which may be applied by data validators in compliance with BHI validation SOW are as follows:

U - Indicates the compound or analyte was analyzed for and not detected in the sample. The value reported is the sample quantitation limit corrected for sample dilution and moisture content by the laboratory.

UJ - Indicates the compound or analyte was analyzed for and not detected in the sample. Due to a QC deficiency identified during the data validation, the associated quantitation limit is an estimate.

J - Indicates the compound or analyte was analyzed for and detected. Due to a QC deficiency identified during the data validation, the associated concentration is an estimate, but the data are usable for decision-making purposes.

BJ - Applied to inorganic analyses only. Indicates the analyte concentration was greater than the IDL but less than the CRDL and is considered an estimated value.

R - Indicates the compound or analyte was analyzed for, detected, and due to an identified QC deficiency, the data are unusable.

UR - Indicates the compound or analyte was analyzed for and not detected in the sample. Additionally, the data is unusable due to an identified QC deficiency.

NJ - Indicates presumptive evidence of a compound at an estimated value. The data may not be valid for some specific applications (i.e., usable for decision-making purposes).

N - Indicates presumptive evidence of a compound. The data may not be valid for some specific applications (i.e., usable for decision-making purposes).

Appendix 2

Summary of Data Qualification

DATA QUALIFICATION SUMMARY

SDG: H0924	REVIEWER: TLI	DATE: 10/6/00	PAGE 1 OF 1
COMMENTS: No qualifiers assigned			
COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON

Appendix 3

Qualified Data Summary and Annotated Laboratory Reports

Project: BECHTEL-HANFORD																	
Laboratory: RECRA LabNet																	
Case	SDG: H0924																
Sample Number		B0YR43		B0YR44		B0YR45		B0YR46		B0YR47		B0YR48		B0YR49			
Location		100-H-17		100-H-17		100-H-17		100-H-17		100-H-17		100-H-17		100-H-17			
Remarks																	
Sample Date		7/20/00		7/20/00		7/20/00		7/20/00		7/20/00		7/20/00		7/20/00			
Inorganics	CRDL	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Chromium VI	0.1	0.41	U	0.46	U	0.40	U	0.40	U	0.41	U	0.40	U	0.47			
Arsenic (total)		3.4		3.3		2.5		2.3		3.6		2.9		2.4			
Chromium (total)	0.5	9.9		11.1		9.2		10.5		7.6		10.2		9.4			
Lead (total)	2	5.6		5.6		4.0		3.1		6.2		6.1		3.6			
Sample Number		B0YR50		B0YR51		B0YR53											
Location		100-H-17		100-H-17		100-H-17											
Remarks				Duplicate		E. Blank											
Sample Date		7/20/00		7/20/00		7/20/00											
Inorganic Anasyis	CRDL	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Chromium VI	0.1	0.43		0.40	U	0.40	U										
Arsenic (total)		3.7		2.6		0.30	U										
Chromium (total)	0.5	11.7		11.6		0.21											
Lead (total)	2	8.4		3.9		1.2											

Recra LabNet - Lionville

INORGANICS DATA SUMMARY REPORT 08/17/00

CLIENT: TMU-HANFORD B99-042 RECRA LOT #: 0007L961

WORK ORDER: 10985-001-001-9999-00

SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING LIMIT	DILUTION FACTOR
-001	B0YR43	% Solids	98.6	%	0.01	1.0
		Chromium VI	0.41 u	MG/KG	0.41	1.0
-002	B0YR44	% Solids	87.4	%	0.01	1.0
		Chromium VI	0.46 u	MG/KG	0.46	1.0
-003	B0YR45	% Solids	99.5	%	0.01	1.0
		Chromium VI	0.40 u	MG/KG	0.40	1.0
-004	B0YR46	% Solids	99.8	%	0.01	1.0
		Chromium VI	0.40 u	MG/KG	0.40	1.0
-005	B0YR47	% Solids	98.1	%	0.01	1.0
		Chromium VI	0.41 u	MG/KG	0.41	1.0
-006	B0YR48	% Solids	99.2	%	0.01	1.0
		Chromium VI	0.40 u	MG/KG	0.40	1.0
-007	B0YR49	% Solids	98.8	%	0.01	1.0
		Chromium VI	0.47	MG/KG	0.40	1.0
-008	B0YR50	% Solids	94.8	%	0.01	1.0
		Chromium VI	0.43	MG/KG	0.42	1.0
-009	B0YR51	% Solids	99.8	%	0.01	1.0
		Chromium VI	0.40 u	MG/KG	0.40	1.0
-010	B0YR53	% Solids	100	%	0.01	1.0
		Chromium VI	0.40 u	MG/KG	0.40	1.0

10/4/00

~~0~~ 4

Severn LabNet - Lionville

INORGANICS DATA SUMMARY REPORT 08/23/00

CLIENT: TMU-HANFORD B99-042 RECRA LOT #: 0007L961

WORK ORDER: 10985-001-001-9999-00

SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING LIMIT	DILUTION FACTOR
-001	B0YR43	Arsenic, Total	3.6	MG/KG	0.31	1.0
		Chromium, Total	9.9	MG/KG	0.08	1.0
		Lead, Total	5.6	MG/KG	0.19	1.0
-002	B0YR44	Arsenic, Total	3.3	MG/KG	0.35	1.0
		Chromium, Total	11.1	MG/KG	0.09	1.0
		Lead, Total	5.6	MG/KG	0.22	1.0
-003	B0YR45	Arsenic, Total	2.5	MG/KG	0.30	1.0
		Chromium, Total	9.2	MG/KG	0.08	1.0
		Lead, Total	4.0	MG/KG	0.19	1.0
-004	B0YR46	Arsenic, Total	2.3	MG/KG	0.31	1.0
		Chromium, Total	10.5	MG/KG	0.08	1.0
		Lead, Total	3.1	MG/KG	0.19	1.0
-005	B0YR47	Arsenic, Total	3.6	MG/KG	0.31	1.0
		Chromium, Total	7.6	MG/KG	0.08	1.0
		Lead, Total	6.2	MG/KG	0.19	1.0
-006	B0YR48	Arsenic, Total	2.9	MG/KG	0.30	1.0
		Chromium, Total	18.2	MG/KG	0.08	1.0
		Lead, Total	6.1	MG/KG	0.18	1.0
-007	B0YR49	Arsenic, Total	2.4	MG/KG	0.31	1.0
		Chromium, Total	9.4	MG/KG	0.08	1.0
		Lead, Total	3.6	MG/KG	0.19	1.0
-008	B0YR50	Arsenic, Total	3.7	MG/KG	0.31	1.0
		Chromium, Total	11.7	MG/KG	0.08	1.0
		Lead, Total	8.4	MG/KG	0.19	1.0
-009	B0YR51	Arsenic, Total	2.6	MG/KG	0.30	1.0
		Chromium, Total	11.6	MG/KG	0.08	1.0
		Lead, Total	3.9	MG/KG	0.19	1.0
-010	B0YR53	Arsenic, Total	0.30 U	MG/KG	0.30	1.0
		Chromium, Total	0.21	MG/KG	0.08	1.0
		Lead, Total	1.2	MG/KG	0.18	1.0

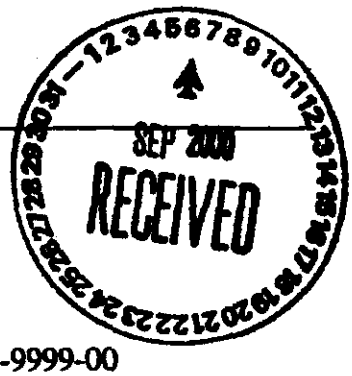
R 10/3/00

Appendix 4

Laboratory Narrative and Chain-of-Custody Documentation

RECRA ENVIRONMENTAL INC.

Chemical and Environmental Measurement Information



Recra LabNet Philadelphia
Analytical Report

Client : TNU-HANFORD B99-042
RFW# : 0007L961
SDG# : H0924
SAF# : B99-042

W.O. # : 10985-001-001-9999-00
Date Received: 07-25-00

INORGANIC CASE NARRATIVE

1. This narrative covers the analyses of 10 soil samples.

2. The samples were prepared and analyzed in accordance with the methods checked on the attached glossary.

3. Sample holding times as required by the method and/or contract were met.

4. The cooler temperature was recorded on the chain-of-custody.

5. The method blank for Chromium VI was within method criteria.

6. The Laboratory Control Samples (LCS) for Chromium VI were within the laboratory control limits.

7. The matrix spike recoveries for Chromium VI were within the 75-125% control limits.

8. The replicate analyses were within the 20% Relative Percent Difference (RPD) control limit.

9. Results for solid samples are reported on a dry weight basis.

10. I certify that this sample data package is in compliance with SOW requirements, both technically and for completeness, other than the conditions detailed above. Release of the data contained in this hard copy data package has been authorized by the Laboratory Manager or a designee, as verified by the following signature.

08-29-00
Date

J. Michael Taylor
Vice President
Philadelphia Analytical Laboratory

njp\07-961

RECRA ENVIRONMENTAL INC.

Chemical and Environmental Measurement Information

Recra LabNet Philadelphia
Analytical Report

Client : TNU-HANFORD B99-042
RFW# : 0007L961
SDG/SAF# : H0924/B99-042

W.O.# : 10985-001-001-9999-00
Date Received: 07-25-00

METALS CASE NARRATIVE

1. This narrative covers the analyses of 10 soil samples.

2. The samples were prepared and analyzed in accordance with methods checked on the attached glossary.

3. All analyses were performed within the required holding times.

4. The cooler temperature has been recorded on the Chain of Custody.

5. All Initial and Continuing Calibration Verifications (ICV/CCVs) were within the 90-110% control limits (80-120% for Mercury).

6. All Initial and Continuing Calibration Blanks (ICB/CCBs) were within control limits (less than the PQL).

7. All preparation/method blanks (MB) were within method criteria {less than the Practical Quantitation Limit (3X the IDL) or samples greater than 20X MB value}. Refer to the Inorganics Method Blank Data Summary.

8. All ICP Interference Check Standards were within control limits.

9. All laboratory control samples (LCS) were within the laboratory control limits. Refer to the Inorganics Laboratory Control Standards Report.

10. All matrix spike (MS) recoveries were within the 75-125% control limits. Refer to the Inorganics Accuracy Report.

11. All duplicate analyses were within the 20% Relative Percent Difference (RPD) control limits. Refer to the Inorganics Precision Report.

12. For the purposes of this report, the data has been reported to the Instrument Detection Limit (IDL). Values between the IDL and the Practical Quantitation Limit (PQL) are acquired in a region of less-certain quantification.

13. I certify that this sample data package is in compliance with SOW requirements, both technically and for completeness, other than the conditions detailed above. Release of the data contained in this hard-copy data package has been authorized by the Laboratory Manager or a designee, as verified by the following signature.

09-05-00

J. Michael Taylor
Vice President
Philadelphia Analytical Laboratory
Date

mld/m07-961

Bechtel Hanford Inc. | **CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST** | B99-042-045 | Page 1 of 1

Collector: Renee Nielson / M. Stankovich	Company Contact: Mike Stankovich; Telephone No. 531-7620	Project Coordinator: TRENT, SJ	Price Code 8L; Data Turnaround 21 Days
Project Designation: 100 H Area - Full Protocol	Sampling Location: 100-H-17	SAF No. B99-042	Air Quality ☐
Ice Chest No. ERC99 011 7OF7	Field Logbook No. EL-1500-2; COA R00H172600	Method of Shipment: Federal Express	
Shipped To: TMA/RECRA (RJN 7/20/00 RECRA)	Offsite Property No. A000242	Bill of Lading/Air Bill No. 4235795337490	

POSSIBLE SAMPLE HAZARDS/REMARKS
NONE

Special Handling and/or Storage

000017

Preservation	None	Cool 4C	None	None
Type of Container	aG	aG	aG	aG
No. of Container(s)	1	1	1	1
Volume	60mL	125mL	250mL	1000mL
SAMPLE ANALYSIS	Strontium-90,89 – Total Sr, Nickel-63, Technetium-99 (RJN 7/20/00)	Chromium Hex - 7196	See item (1) in Special Instructions.	See item (2) in Special Instructions.

Sample No.	Matrix *	Sample Date	Sample Time					
B0YR49	SOIL	7/20/00	0947		X	X		B7
B0YR50	SOIL	7/20/00	0930		X	X		B8
B0YR51	SOIL	7/20/00	0923		X	X		
B0YR53	SOIL	7/20/00	0827		X	X		

CHAIN OF POSSESSION Relinquished By	Date/Time	Received By	Date/Time
R. Nielson	7/20/00 1534	R. Thoreen	7-20-00 1534
R. Thoreen	7.24.00 1430	FED EX	
Fed Ex	7.25.00/0915	D. [illegible]	7.25.00 /0915

SPECIAL INSTRUCTIONS
RJN 7/20/00
(1) ICP Metals - 6010A (Supertrace) (Arsenic, Chromium, Lead); ~~Mercury - 7471 - (CV)~~
~~(2) Gamma Spectroscopy (Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155)~~
RT 7.24.00

TI-TO B0V8W0

Matrix *: S=Soil, SE=Sediment, SO=Solid, SL=Sludge, W=Water, O=Oil, A=Air, DS=Drum Solids, DL=Drum Liquids, T=Tissue, WI=Wipe, L=Liquid, V=Vegetation, X=Other

LABORATORY SECTION	Received By	Title	Date/Time
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

9HI-EE-011 (10/99)

Bechtel Hanford Inc.	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST		B99-042-044
Collector: Renee Nielson / M. Stankovich	Company Contact: Mike Stankovich; Telephone No.: 531-7620	Project Coordinator: TRENT, SJ	Price Code: 8L; Data Turnaround: 21 Days
Project Designation: 100 H Area - Full Protocol	Sampling Location: 100-H-17	SAF No.: B99-042	Air Quality ☐
Ice Chest No.: EPC 99-011 7 OF 7	Field Logbook No.: EL-1500-2; COA: R00H172600	Method of Shipment: Federal Express	
Shipped To: TMA/RECRA — RECRA	Offsite Property No.: A000242	Bill of Lading/Air Bill No.: 4235 7983-7440	

POSSIBLE SAMPLE HAZARDS/REMARKS: None

Special Handling and/or Storage:

000018

Preservation	None	Cool 4C	None	None
Type of Container	aG	aG	aG	aG
No. of Container(s)		1	1	
Volume		125mL	250mL	
SAMPLE ANALYSIS	Strontium-89,90 - Total Sr; Nickel-63; Technetium-99 (RJH 7/20/00)	Chromium Hex - 7196	See item (1) in Special Instructions.	See item (2) in Special Instructions.

Sample No.	Matrix *	Sample Date	Sample Time	Sr/Ni/Tc	Chromium Hex	Item (1)	Item (2)	
B0YR46	SOIL	7/20/00	0923		X	X		A4
B0YR47	SOIL	7/20/00	1000		X	X		B5
B0YR48	SOIL	7/20/00	0945		X	X		B6

CHAIN OF POSSESSION — Sign/Print Names

Relinquished By	Date/Time	Received By	Date/Time
[signature] / R. Nielson	7/20/00 1534	R. Thomas / R. Thomas	7.20.00 1534
R. Thomas / R. Thomas	7.24.00 1430	FedEx	
[signature] FedEx	7.25.00/0915	[signature]	7.25.00 0915

SPECIAL INSTRUCTIONS 7/20/00 RJN

(1) ICP Metals - 6010A (Supertrace) {Arsenic, Chromium, Lead}; ~~Mercury—7471—(CV)~~

~~(2) Gamma Spectroscopy {Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155}~~

RT 7.24.00

TIE TO B0V8W0

Matrix *: S=Soil, SE=Sediment, SO=Solid, SL=Sludge, W=Water, O=Oil, A=Air, DS=Drum Solids, DL=Drum Liquids, T=Tissue, WI=Wipe, L=Liquid, V=Vegetation, X=Other

LABORATORY SECTION	Received By	Title	Date/Time
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

Bechtel Hanford Inc.	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	B99-042-043	Page 1 of 1
Collector: Renee Nielson / Stankovich	Company Contact: Mike Stankovich — Telephone No.: 531-7620	Project Coordinator: TRENT, SJ	Price Code: 8L — Data Turnaround: 21 Days
Project Designation: 100 H Area - Full Protocol	Sampling Location: 100-H-17	SAF No.: B99-042	Air Quality: ☐
Ice Chest No.: ERC99 011 7 OF 7	Field Logbook No.: EL-1500-2 — COA: 800H172600	Method of Shipment: Federal Express	
Shipped To: TMA/RECRA RECRA	Offsite Property No.: A000242	Bill of Lading/Air Bill No.: 42357953 7490	

POSSIBLE SAMPLE HAZARDS/REMARKS

none

Special Handling and/or Storage

Preservation	None	Cool 4C	None	None						
Type of Container	aG	aG	aG	P						
No. of Container(s)	1	1	1	1						
Volume	125mL	125mL	250mL	500mL						
SAMPLE ANALYSIS	Strontium-90,99 - Total Sr; Nickel-63; Technetium-99 RJN 7/20/00	Chromium Hex - 7196	See Item (1) in Special Instructions.	Surface Soil Pick-up Special Instructions.						

Sample No.	Matrix *	Sample Date	Sample Time									
B0YR43	SOIL	7/20/00	0835		X	X						A
B0YR44	SOIL	7/20/00	0847		X	X						A
B0YR45	SOIL	7/20/00	0855		X	X						A

CHAIN OF POSSESSION

Relinquished By	Date/Time	Received By	Date/Time
Stankovich / R. Nielson / R. Nielson	7/20/00 1534	R. Thorsen	7/20/00 1534
R. Thorsen	7/20/00 1450	FEDEX	
	7-25-00	D. Johnson	7-25-00/0915

Sign/Print Names

SPECIAL INSTRUCTIONS

RJN 7/20/00

(1) ICP Metals - 6010A (Superfund) (Arsenic, Chromium, Lead); Mercury - 7471 - (CVA)
(2) Gamma Spectroscopy - (Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155)

RT 7-24

TIE TO BOY800

Matrix *

S-Soil, SD-Sediment, SO-Solid, SL-Sludge, W-Water, O-Oil, A-Air, DS-Drum Solids, DL-Drum Liquids, T-Tissue, WI-Wipe, L-Liquid, V-Vegetation, X-Other

LABORATORY SECTION	Received By	Title	Date/Time
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

BHI-EE-011 (10/99)

Appendix 5

Data Validation Supporting Documentation

INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	C	D	E
PROJECT: 100 H 100-H-17			DATA PACKAGE: H0924		
VALIDATOR: TLL		LAB: RECRA		DATE: 9/27/00	
CASE:			SDG: H0924		

ANALYSES PERFORMED

☐ CLP/ICP	☐ CLP/GFAA	☐ CLP/Hg	☐ CLP/Cyanide	☐	☐
☒ SW-846/ICP	☐ SW-846/GFAA	☐ SW-846/Hg	☐ SW-846 Cyanide	☐	☐

SAMPLES/MATRIX B04R43 B04R44 B04R45 B04R46
B04R47 B04R48 B04R49 B04R50
B04R51 B04R53

Soil

1. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE

Is technical verification documentation present? . . . . . Yes No (N/A)

Is a case narrative present? . . . . . (Yes) No N/A

Comments: _____

2. HOLDING TIMES

Are sample holding times acceptable? . . . . . (Yes) No N/A

Comments: _____

INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

3. INSTRUMENT PERFORMANCE AND CALIBRATIONS

Were initial calibrations performed on all instruments?	Yes	No	N/A
Are initial calibrations acceptable?	Yes	No	N/A
Are ICP interference checks acceptable?	Yes	No	N/A
Were ICV and CCV checks performed on all instruments?	Yes	No	N/A
Are ICV and CCV checks acceptable?	Yes	No	N/A

Comments:

4. BLANKS

Were ICB and CCB checks performed for all applicable analyses?	Yes	No	N/A
Are ICB and CCB results acceptable?	Yes	No	N/A
Were preparation blanks analyzed?	Yes	No	N/A
Are preparation blank results acceptable?	Yes	No	N/A
Were field/trip blanks analyzed?	Yes	No	N/A
Are field/trip blank results acceptable?	Yes	No	N/A

Comments: Chromium Chromium (total) & lead in eb

5. ACCURACY

Were spike samples analyzed?	Yes	No	N/A
Are spike sample recoveries acceptable?	Yes	No	N/A
Were laboratory control samples (LCS) analyzed?	Yes	No	N/A
Are LCS recoveries acceptable?	Yes	No	N/A

Comments:

INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

6. PRECISION

Were laboratory duplicates analyzed?	Yes	No	N/A
Are laboratory duplicate samples RPD values acceptable?	Yes	No	N/A
Were ICP serial dilution samples analyzed?	Yes	No	N/A
Are ICP serial dilution %D values acceptable?	Yes	No	N/A
Are field duplicate RPD values acceptable?	Yes	No	N/A
Are field split RPD values acceptable?	Yes	No	N/A

Comments: _____

7. FURNACE AA QUALITY CONTROL

Were duplicate injections performed as required?	Yes	No	N/A
Are duplicate injection %RSD values acceptable?	Yes	No	N/A
Were analytical spikes performed as required?	Yes	No	N/A
Are analytical spike recoveries acceptable?	Yes	No	N/A
Was MSA performed as required?	Yes	No	N/A
Are MSA results acceptable?	Yes	No	N/A

Comments: _____

8. REPORTED RESULTS AND DETECTION LIMITS

Are results reported for all requested analyses?	Yes	No	N/A
Are all results supported in the raw data?	Yes	No	N/A
Are results calculated properly?	Yes	No	N/A
Do results meet the CRDLs?	Yes	No	N/A

Comments: CRDL undetects our

Recra LabNet - Lionville

INORGANICS METHOD BLANK DATA SUMMARY PAGE 08/17/00

CLIENT: TWU-HANFORD B99-042 RECRA LOT #: 0007L961

WORK ORDER: 10985-001-001-9999-00

SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING LIMIT	DILUTION FACTOR
BLANK10	00LVI043-MB1	Chromium VI	0.40 u	MG/KG	0.40	1.0

Recra LabNet - Lionville

INORGANICS ACCURACY REPORT 08/17/00

CLIENT: TMU-HANFORD B99-042 RECRA LOT #: 0007L961

WORK ORDER: 10985-001-001-9999-00

SAMPLE	SITE ID	ANALYTE	SPIKED SAMPLE	INITIAL RESULT	SPIKED AMOUNT	%RECOV	DILUTION FACTOR(SPK)
-010	B0YR53	Soluble Chromium VI	5.1	0.40u	4.0	119.8	1.0
		Insoluble Chromium VI	1190	0.40u	1160	101.0	100
BLANK10	00LVI043-MB1	Soluble Chromium VI	4.1	0.40u	4.0	101.6	1.0
		Insoluble Chromium VI	1180	0.40u	1160	101.7	100

Recra LabNet - Lionville

INORGANICS PRECISION REPORT 08/17/00

CLIENT: TMU-HANFORD B99-042 RECRA LOT #: 0007L961

WORK ORDER: 10985-001-001-9999-00

SAMPLE	SITE ID	ANALYTE	INITIAL RESULT	REPLICATE	RPD	DILUTION FACTOR (REP)
-002REP	B0YR44	% Solids	87.4	87.5	0.034	1.0
-010REP	B0YR53	Chromium VI	0.40u	0.40u	NC	1.0

Recra LabNet - Lionville

INORGANICS METHOD BLANK DATA SUMMARY PAGE 08/23/00

CLIENT: TMU-HANFORD B99-042 RECRA LOT #: 0007L961

WORK ORDER: 10988-001-001-9999-00

SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING LIMIT	DILUTION FACTOR
BLANK1	99L1478-MB1	Arsenic, Total	0.34 u	MG/KG	0.34	1.0
		Chromium, Total	0.13	MG/KG	0.09	1.0
		Lead, Total	0.47	MG/KG	0.21	1.0

06

Severn LabNet - Livermore

INORGANICS ACCURACY REPORT 08/23/00

CLIENT: TMU-HANFORD B99-042 RECRA LOT #: 0007L961

WORK ORDER: 10985-001-001-9999-00

SAMPLE	SITE ID	ANALYTE	SPIKED SAMPLE	INITIAL RESULT	SPIKED AMOUNT	%RECOV	DILUTION FACTOR(SPK)
-001	B0YR43	Arsenic, Total	181	3.4	184	96.2	1.0
		Chromium, Total	29.4	9.9	18.4	106.0	1.0
		Lead, Total	80.8	5.6	46.1	98.0	1.0

Recra LabNet - Lionville

INORGANICS PRECISION REPORT 08/23/00

CLIENT: TMU-HANFORD B99-042 RECRA LOT #: 0007L961

WORK ORDER: 10985-001-001-9999-00

SAMPLE	SITE ID	ANALYTE	INITIAL RESULT	REPLICATE	RPD	DILUTION FACTOR (REP)
-001REP	B0YR43	Arsenic, Total	3.4	3.0	12.5	1.0
		Chromium, Total	9.9	9.3	6.2	1.0
		Lead, Total	5.6	5.6	0.00	1.0

Duncan, Jeanette M

From: Routt, Tina/RLO [troutt@ch2m.com]
Sent: Thursday, October 12, 2000 7:48 AM
To: Duncan, Jeanette/RLO-HAN
Subject: Review of Validation for H0924 (100-H-17)

Jeanette -

I've reviewed the validation results for H0924. I agree with most of what he says, but have the following changes:

Radiochemistry: Page 3, Detection Levels - cobalt-60, MDAs are not greater than TDLs in samples B0YR50 and B0YR51 as he says. All of his other MDA/TDL statements are correct. I would also add that Pu-239/240 has MDA>TDL in samples B0YR43 and B0YR51, and U-238 (non-GEA, U-Iso) has MDA>TDL in sample B0YR51.

Inorganics: No changes.

Tina Routt
CH2M Hill Richland Office
troutt@ch2m.com
(509) 375-3444, ext. 211
(509) 375-5566 fax

Duncan, Jeanette M

From: Duncan, Jeanette M
Sent: Thursday, October 26, 2000 3:35 PM
To: 'bchristian@techlawinc.com'
Subject: Validation Review Comments for H0950, H0943, H0958 & H0933

Bruce,

H0924 (100-H-17) - to respond back to your e:mail on the 100-H-17 (H0924) - this is the one that was so hosed up with the inorganic pages in the rad - that I will need to get a full new copy of this. I do not want you to send this yet - I have an OK from Rich and Claude that your comment incorporation was fine - but Tina is not in today so I do not know if all is well with her. So, hold off until I hear from Tina.

H0950 (100-H-21) - just sent you an 8 page efax that included review comments for this validation package. Please incorporate comments. Also - on this one - please check the title - you have 116-H-3 on both the chem and rad. Please change to 100-H-21 (Pipeline Deep Zone).

H0943 (116-H-3) - this is also in the 8 page efax that we sent this afternoon.

H0958 (105F/DR) - this is also in the 8 page efax that we sent this afternoon.

Please send your page changes to the review comments electronically (or via fax). If there are massive changes (like Grp 3 Small Pipelines) send the whole tamale.

Thanks for your support.

Jeanette

Review Comment Record (RCR)

1. Date	2. Review No.
10/25/00	QA-0044
3. Project	**4. Page**
100-H	Page 1 of 1

5. Document Number(s)/Title(s)	6. Program/Project/ Building Number	7. Reviewer	8. Organization/Group	9. Location/Phone
SDG No. H0924	100-H Areas - Full Protocol, Waste Sites 100-H-17	Claude Stacey	Quality Program	372-9208

17. Comment Submitted Approval:

Organization Manager (Optional) — Date

10. Agreement with indicated comment disposition(s)

Reviewer/Point of Contact — Date

Author/Originator

11. CLOSED

11/01/00 — Date

Reviewer/Point of Contact

Author/Originator

12. Item	13. Comment(s)/Discrepancy(s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/ resolve the discrepancy/problem indicated.)	14. Hold Point	15. Disposition (Provide justification if NOT accepted.)	16. Status
1	Radiochemistry: Page 003, Detection Levels and Page 004, Minor Deficiencies Pu-238 and Pu-239/240 needs to be added to the list for samples B0YR43 and B0YR51. Also U-235 (gea) needs to be added for samples B0YR50 and B0YR51. For Co-60, samples B0YR50 and B0YR51 should not be listed.		Correct As	
2	Inorganic: Ok No Comments.			
3				
4				
5				

Duncan, Jeanette M

From: Weiss, Richard L
Sent: Thursday, October 12, 2000 3:07 PM
To: Duncan, Jeanette M
Subject: Review of Validation Package for H0-924

Jeanette,

The errors noted by Tina Routt in the rad package MDA section need to be fixed. In addition, I've found the following additional errors: U-235 (aspec)- all samples exceeded MDA goals. U-238 (aspec) - MDA goal missed for B0YR51. U-233/234 (apsec) - MDA goal missed for B0YR51. Pu-238 (aspec) - MDA goals missed for B0YR43 and B0YR51. U-235 (gea) - All samples missed MDA goals except B0YR49 and B0YR63.

Am-241 in the MDA sections should be identified as AM-241 (gea). Correct

No comments on the Inorganic package.

Rich

to Jeanette Duncan

fm RB Christian

Pages 4

10/23/00

BHI Sample Management
Phone: (509) 372-9346
FAX: (509) 372-9487

facsimile transmittal

To: Claude Stacey Fax: 372-9447

From: Jeanette Duncan Date: 10/24/00

Re: Pages: 4

CC:

☐ Quick Turn / Priority Data ☐ Final Data Package

H0924 (100-H-17) Replacement pages for rad validation.

Thermo Retec
W.O. No. R0-07-125-7445

Bechtel Hanford Inc.
SDG H0924

Case Narrative

1.0 GENERAL

Bechtel Hanford Inc. (BHI) Sample Delivery Group H0924 was composed of ten solid (soil) samples designated under SAF No. B99-042 with a Project Designation of: 100 H Area – Full Protocol.

The samples were received as stated on the Chain-of-Custody documents. Any discrepancies are noted on the Thermo Retec Sample Receipt Checklist. The results were transmitted to BHI via e-Fax on August 14, 30, and September 5, 2000.

2.0 ANALYSIS NOTES

2.1 Total Strontium Analyses

No problems were encountered during the course of the analyses.

2.2 Isotopic Uranium Analyses

Isotopic Uranium was requested by BHI on August 17, 2000.

No problems were encountered during the course of the analyses.

2.3 Isotopic Plutonium Analyses

Isotopic Plutonium was requested by BHI on August 17, 2000.

No problems were encountered during the course of the analyses.

2.4 Gamma Spectroscopy Analyses

No problems were encountered during the course of the analyses.

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TRANSMISSION RESULT REPORT (OCT 24 '00 07:46AM)

BHI S&D MANAGEMENT 509 372 9487

(AUTO)

THE FOLLOWING FILE(S) ERASED

FILE	FILE TYPE	OPTION	TEL NO.	PAGE	RESULT
026	MEMORY TX		3729447	04/04	OK

ERRORS

1) HANG UP OR LINE FAIL 2) BUSY 3) NO ANSWER 4) NO FACSIMILE CONNECTION

BHI Sample Management
Phone: (509) 372-9346
FAX: (509) 372-9487

facsimile transmittal

To: Claude Stacey Fax: 372-9447

From: Jeanette Duncan Date: 10/24/00

Re: Pages: 4

CC:

☐ Quick Turn / Priority Data ☐ Final Data Package

H0924 (100-H-17) Replacement pages for read

Duncan, Jeanette M

From: Routt, Tina/RLO [troutt@ch2m.com]
Sent: Thursday, October 26, 2000 3:28 PM
To: Duncan, Jeanette M
Subject: RE: Validation Review Comments - 100-H-17

Jeanette -

Since I don't know what the comments were and I didn't have any problems with the first one, I don't know how to review the new comments. I think most of the comments were beyond my technical review of the document in the first place, so no comment.

Tina

-----Original Message-----
From: Duncan, Jeanette M [mailto:JMDuncan@mail.bhi-erc.com]
Sent: October 26, 2000 11:06 AM
To: Stacey, Claude; Routt, Tina/RLO
Subject: FW: Validation Review Comments - 100-H-17

Claude & Tina,

Please review the attached page changes to the 100-H-17 Validation Report (H0924) - the validator has dispositioned the review comments. Rich has already reviewed these and is happy with the changes. Please let me know if you have any problems with the validator's changes.

Oh and just as a heads up - in order to open this file I had to go into Word and then open.

Jeanette

-----Original Message-----
From: Christian, Bruce [mailto:BCHRISTIAN@TechLawInc.com]
Sent: Wednesday, October 25, 2000 9:47 PM
To: 'Duncan, Jeanette M '
Subject: RE: Validation Review Comments - 100-H-17

Will this do or do you need a hard copy.

-----Original Message-----
From: Duncan, Jeanette M
To: 'bchristian@techlawinc.com'
Sent: 10/25/00 4:50 PM
Subject: Validation Review Comments - 100-H-17

Bruce,

Just efaxed you the validation review comments for H0924 (100-H-17). Needless to say the client has been as patient as possible - and this is the
one that both Tina and Rich have substantial input - please please please
get to this one as soon as possible. Thanks.

Jeanette

Review Comment Record (RCR)

1. Date	2. Review No.
10/25/00	QA-0044
3. Project	4. Page
100-H	Page 1 of 1

5. Document Number(s)/Title(s)	6. Program/Project/ Building Number	7. Reviewer	8. Organization/Group	9. Location/Phone
SDG No. H0924	100-H Areas - Full Protocol, Waste Sites 100-H-17	Claude Stacey	Quality Program	372-9208

17. Comment Submittal Approval:

Organization Manager (Optional) _____ Date

Reviewer/Point of Contact _____ Date

Author/Originator

10. Agreement with indicated comment disposition(s)

Reviewer/Point of Contact _____ Date

Author/Originator

11. CLOSED

12. Item	13. Comment(s)/Discrepancy(s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/ resolve the discrepancy/problem indicated.)	14. Hold Point	15. Disposition (Provide justification if NOT accepted.)	16. Status
1	Radiochemistry: Page 003, Detection Levels and Page 004, Minor Deficiencies Pu-238 and Pu-239/240 needs to be added to the list for samples B0YR43 and B0YR51. Also U-235 (gea) needs to be added for samples B0YR50 and B0YR51. For Co-60, samples B0YR50 and B0YR51 should not be listed.			
2	Inorganic: Ok No Comments.			
3				
4				
5				

TRANSMISSION RESULT REPORT (OCT 25 '00 12:42PM)

BHI S&D MANAGEMENT 509 372 9487

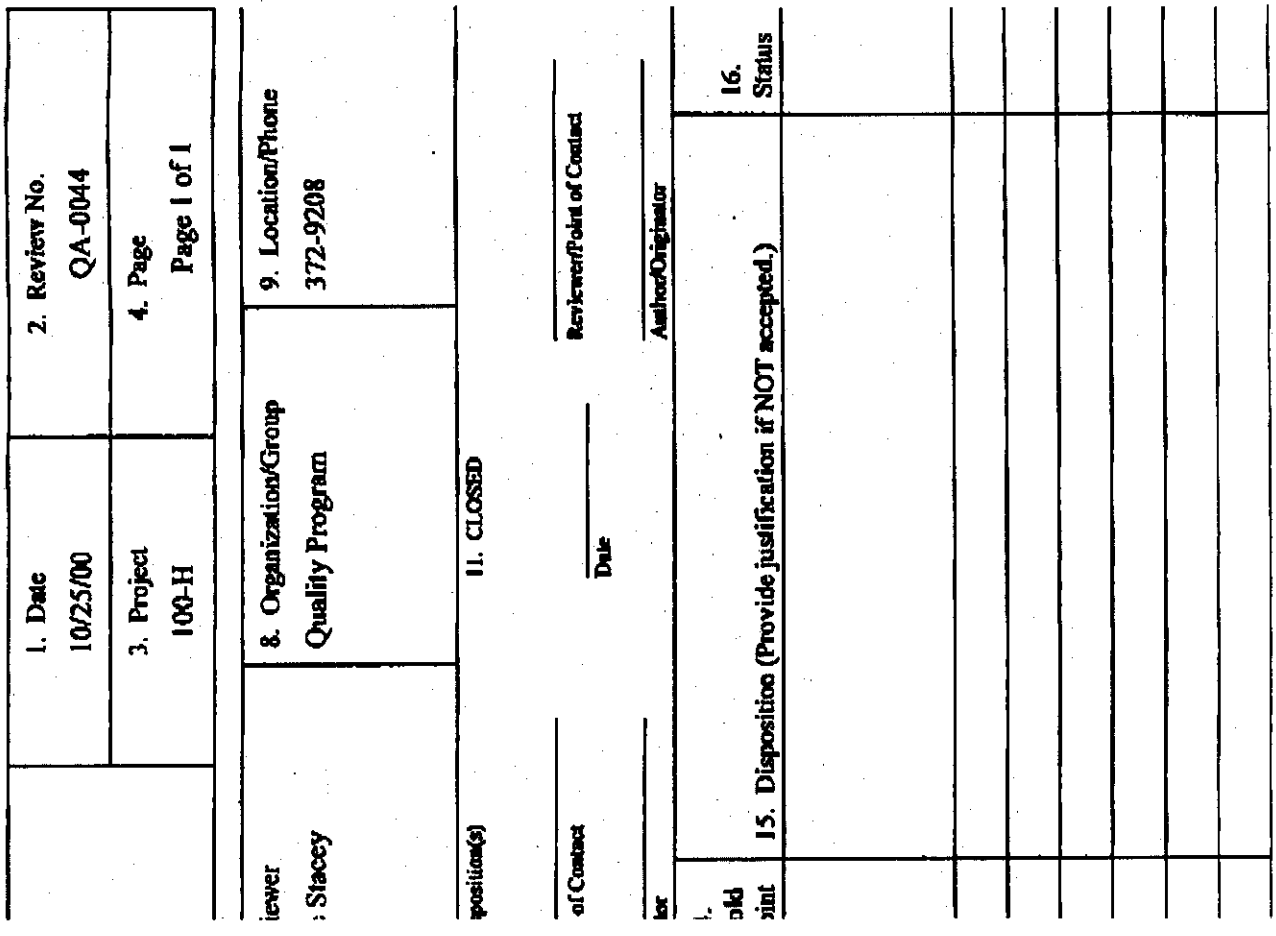
(AUTO)

THE FOLLOWING FILE(S) ERASED

FILE	FILE TYPE	OPTION	TEL NO.	PAGE	RESULT
043	MEMORY TX		12087238944	03/03	OK

ERRORS

1) HANG UP OR LINE FAIL 2) BUSY 3) NO ANSWER 4) NO FACSIMILE CONNECTION



Duncan, Jeanette M

From: Weiss, Richard L
Sent: Thursday, October 12, 2000 3:07 PM
To: Duncan, Jeanette M
Subject: Review of Validation Package for H0-924

Jeanette,

The errors noted by Tina Routt in the rad package MDA section need to be fixed. In addition, I've found the following additional errors: U-235 (aspec)- all samples exceeded MDA goals. U-238 (aspec) - MDA goal missed for B0YR51. U-233/234 (apsec) - MDA goal missed for B0YR51. Pu-238 (aspec) - MDA goals missed for B0YR43 and B0YR51. U-235 (gea) - All samples missed MDA goals except B0YR49 and B0YR53.

Am-241 in the MDA sections should be identified as AM-241 (gea).

OK
RLW
10-26-00

No comments on the Inorganic package.

Rich

Duncan, Jeanette M

From: Routt, Tina/RLO [troutt@ch2m.com]
Sent: Thursday, October 12, 2000 7:48 AM
To: Duncan, Jeanette/RLO-HAN
Subject: Review of Validation for H0924 (100-H-17)

Jeanette -

I've reviewed the validation results for H0924. I agree with most of what he says, but have the following changes:

Radiochemistry: Page 3, Detection Levels - cobalt-60, MDAs are not greater than TDLs in samples B0YR50 and B0YR51 as he says. All of his other MDA/TDL statements are correct. I would also add that Pu-239/240 has MDA>TDL in samples B0YR43 and B0YR51, and U-238 (non-GEA, U-Iso) has MDA>TDL in sample B0YR51.

Inorganics: No changes.

Tina Routt
CH2M Hill Richland Office
troutt@ch2m.com
(509) 375-3444, ext. 211
(509) 375-5566 fax

Date: 6 October 2000
To: Bechtel Hanford, Inc. (technical representative)
From: TechLaw, Inc.
Project: 100-H Areas - Full Protocol - Waste Site 100-H-17
Subject: Radiochemistry - Data Package No. H0924-TR (SDG No. H0924)

INTRODUCTION

This memo presents the results of data validation on Summary Data Package No. H0924-TR which was prepared by ThermoRetec (TR). A list of samples validated along with the analyses reported and the requested analytes is provided in the following table.

Sample ID	Sample Date	Media	Validation Level	Analysis
B0YR43	7/20/00	Soil	C	See note 1
B0YR44	7/20/00	Soil	C	See note 1
B0YR45	7/20/00	Soil	C	See note 1
B0YR46	7/20/00	Soil	C	See note 1
B0YR47	7/20/00	Soil	C	See note 1
B0YR48	7/20/00	Soil	C	See note 1
B0YR49	7/20/00	Soil	C	See note 1
B0YR50	7/20/00	Soil	C	See note 1
B0YR51	7/20/00	Soil	C	See note 1
B0YR53	7/20/00	Soil	C	See note 1

1 - Gamma spectroscopy; alpha spectroscopy (isotopic plutonium); total strontium.

Data validation was conducted in accordance with the BHI validation statement of work and the 100 Area Remedial Action Sampling and Analysis Plan (DOE/RL May 1998). Appendices 1 through 5 provide the following information as indicated below:

Appendix 1. Glossary of Data Reporting Qualifiers
Appendix 2. Summary of Data Qualification
Appendix 3. Qualified Data Summary and Annotated Laboratory Reports
Appendix 4. Laboratory Narrative and Chain-of-Custody Documentation
Appendix 5. Data Validation Supporting Documentation

DATA QUALITY OBJECTIVES

- **Holding Times**

  Holding times are calculated from Chain-of-Custody forms to determine the validity of the results. The maximum holding time for radiochemical analysis is 6 months.

  All holding times were acceptable.

- **Blanks**

  Laboratory Blanks

  Blank samples are analyzed to determine if positive results are due to laboratory reagent, sample container, or detector contamination. If blank analysis results indicate the presence of an analyte above the MDA, the following qualifiers are applied: All positive sample results less than five times the highest blank concentration are qualified as estimates and flagged "J"; sample results below the MDA are qualified as undetected and flagged "U"; sample results above the MDA and greater than five times the highest blank concentration are not qualified.

  All other blank results were acceptable.

  Equipment Blank

  One equipment blank (B0YR53) was submitted for analysis. Uranium-233, uranium-238(aspec), potassium-40, radium-226, radium-228, thorium-228 and thorium-232 were detected in the equipment blank. Under the BHI statement of work, no qualification is required.

- **Accuracy**

  Accuracy is evaluated by analyzing distilled water or field samples spiked with known amounts of radionuclides. The sample activity as determined by analysis is compared to the known activity to assess accuracy. The acceptable laboratory control sample and matrix spike recovery range is either 70-130% or ± 3 sigma. In addition, samples may be spiked with a radiochemical tracer to assist in isolating the radioisotope of interest with the yield of the tracer being used in calculating sample activity. The acceptable range for tracer recovery is 20% to 105%. Spike sample results outside the above ranges result in associated sample results being qualified as estimates, rejected, or not qualified, depending on the activity of the individual sample.

Due to a radiochemical yield of 108%, the detected isotopic uranium results in sample B0YR46 were qualified as estimates and flagged "J".

All other accuracy results were acceptable.

- **Precision**

Analytical precision is expressed by the RPD between the recoveries of duplicate matrix spike analyses performed on a sample. Precision may also be assessed using unspiked duplicate sample analyses. If both sample and replicate activities are greater than five times the CRDL and the RPD is less than 30 percent, the results are acceptable. If either activities are less then five times the CRDL, a control limit of less than or equal to two times the CRDL is used for soil samples and less than or equal to the CRDL for water samples. If either the original or replicate value is below the CRDL, the applicable control limits are less than or equal to the CRDL for water samples and less than or equal to two times the CRDL for soil samples. If the RPD is outside the applicable control limit, associated results are qualified as estimated detects or estimated non-detects.

All duplicate results were acceptable.

Field Duplicates

One set of field duplicates (B0YR46/B0YR51) were submitted for analysis. The results were compared using the same criteria as for a laboratory duplicate. All field duplicate results were acceptable.

- **Detection Levels**

Reported analytical detection levels for undetected analytes are compared against the 100 Area Remedial Action Sampling and Analysis Plan target detection limits (TDLs) or the contract specified MDA if no TDL was specified, to ensure that laboratory detection levels meet the required criteria. The following analytes were reported above their TDL: Uranium-238(gea) in all samples; uranium-235(aspec) in all samples; americium-241(gea) in all samples except B0YR45 and B0YR53; europium-155 in all samples except B0YR53; uranium-235(gea) in samples B0YR43, B0YR44, B0YR45, B0YR46, B0YR47, B0YR48, B0YR50 and B0YR51; europium-154 in samples B0YR44, B0YR45, B0YR46, B0YR47, B0YR48 and B0YR51; europium-152 in samples B0YR47 and B0YR48; cobalt-60 in samples B0YR45 and B0YR47; uranium-238(aspec) and uranium-233(aspec) in sample B0YR51; plutonium-238 and plutonium-239/240 in samples B0YR43 and B0YR51; cesium-137 in samples B0YR47 and B0YR51. Under the BHI statement of work, no qualifcation is required. All other reported

laboratory MDAs were at or below the analyte-specific TDL or contract specified MDA.

- **Completeness**

  Data Package No. H0924 (SDG No. H0924) was submitted for validation and verified for completeness. The completion rate was 100%.

MAJOR DEFICIENCIES

None found.

MINOR DEFICIENCIES

Due to a radiochemical yield of 108%, the detected isotopic uranium results in sample B0YR46 were qualified as estimates and flagged "J". Data flagged "J" is an estimate, but under the BHI validation SOW, the data may be usable for decision-making purposes. All other validated results are considered accurate within the standard error associated with the methods.

The following analytes were reported above their TDL: Uranium-238(gea) in all samples; uranium-235(aspec) in all samples; americium-241(gea) in all samples except B0YR45 and B0YR53; europium-155 in all samples except B0YR53; uranium-235(gea) in samples B0YR43, B0YR44, B0YR45, B0YR46, B0YR47, B0YR48, B0YR50 and B0YR51; europium-154 in samples B0YR44, B0YR45, B0YR46, B0YR47, B0YR48 and B0YR51; europium-152 in samples B0YR47 and B0YR48; cobalt-60 in samples B0YR45 and B0YR47; uranium-238(aspec) and uranium-233(aspec) in sample B0YR51; plutonium-238 and plutonium-239/240 in samples B0YR43 and B0YR51; cesium-137 in samples B0YR47 and B0YR51. Under the BHI statement of work, no qualifcation is required.

REFERENCES

BHI, MRB-SBB-A23665, *Validation Statement of Work*, Bechtel Hanford Incorporated, September 5, 1997.

DOE/RL-96-22, Rev. 1, *100 Area Remedial Action Sampling and Analysis Plan*, U.S. Department of Energy, May 1998.

Appendix 1

Glossary of Data Reporting Qualifiers

Qualifiers which may be applied by data validators in compliance with the BHI statement of work are as follows:

U - Indicates the compound or analyte was analyzed for and not detected above the minimum detectable activity (MDA) in the sample. The value reported is the sample result corrected for sample dilution and moisture content by the laboratory. The data is usable for decision making purposes.

UJ - Indicates the compound or analyte was analyzed for and not detected at concentrations above the minimum detectable activity (MDA) in the sample. Due to a QC deficiency identified during the data validation, the associated quantitation limit is an estimate, but is usable for decision making purposes.

J - Indicates the compound or analyte was analyzed for and detected. Due to a QC deficiency identified during the data validation, the associated concentration is an estimate, but the data are usable for decision-making purposes.

R - Indicates the compound or analyte was analyzed for, detected, and due to an identified QC deficiency, the data are unusable.

UR - Indicates the compound or analyte was analyzed for and not detected in the sample. Additionally, the data is unusable due to an identified QC deficiency.

Appendix 2

Summary of Data Qualification

Appendix 3

Qualified Data Summary and Annotated Laboratory Reports

Appendix 4

Laboratory Narrative and Chain-of-Custody Documentation

Appendix 5

Data Validation Supporting Documentation